

**AMPEX**  
P59560

**COLORTEC\***  
Model 1011 Direct  
Color Process  
Operation and Maintenance Manual



**AMPEX**

P59560-01

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**Model 1011 Direct**  
**Color Process**  
**Operation and Maintenance Manual**

\*TRADEMARK AMPEX CORP.

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## **FOREWORD**

The Colortec Direct Color Process provides faithful reproduction of standard NTSC color television recordings, and of non-standard color recordings whose rate of change of sync is within the Federal Communications Commission monochrome signals specification. The Direct Color Process is a line-by-line time error correction that reduces the residual time error to less than 5 nanoseconds.



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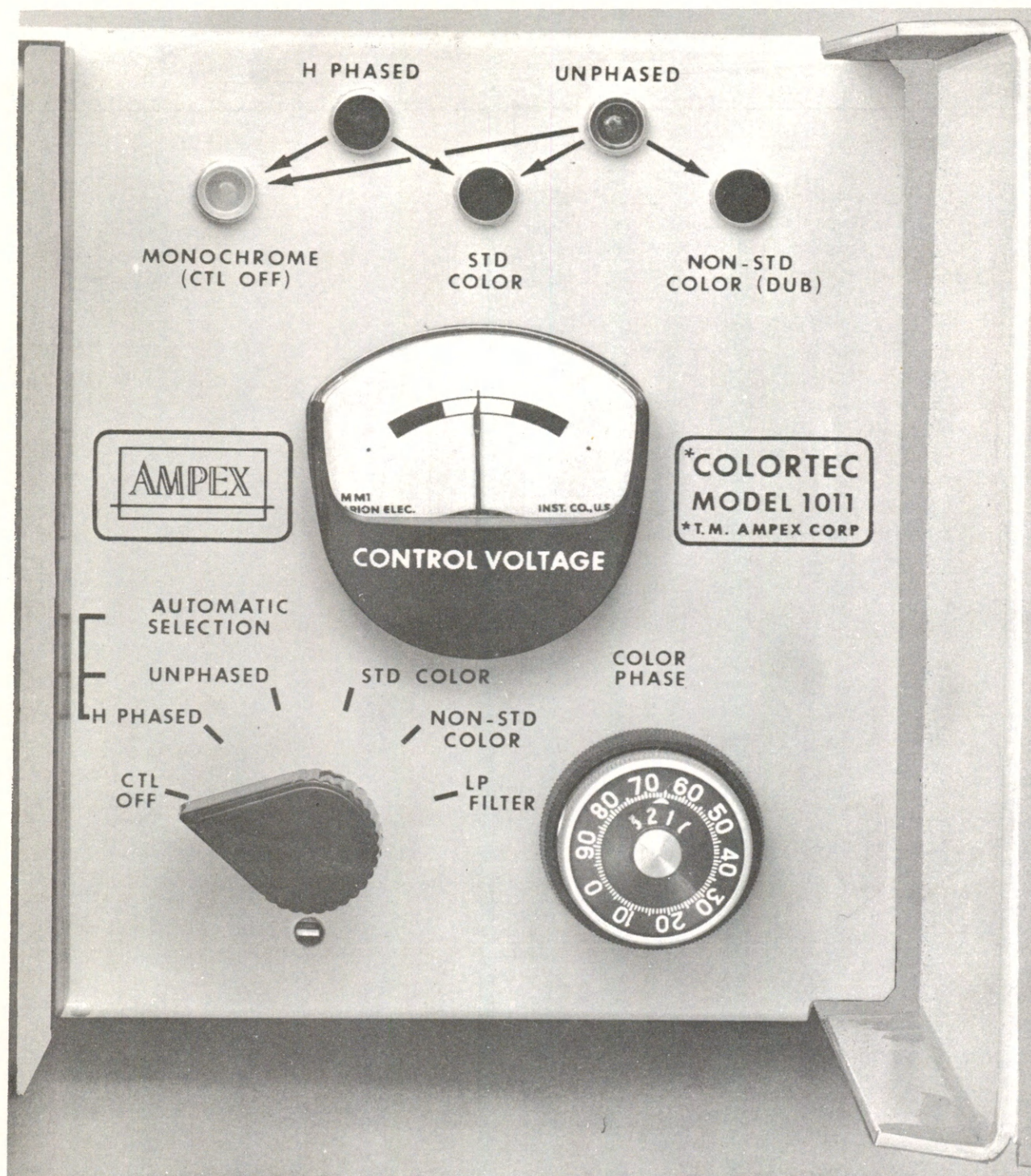


Figure 1. COLORTEC CONTROL PANEL

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# COLORTEC

## INTRODUCTION TO COLORTEC

Colortec-equipped systems do not require the highly complex signal processing characterized by earlier encode-decode, or heterodyning systems. The direct color process does, however, require a high degree of residual time error correction of the reproduced signal. Necessarily this is a successive process that begins with the precise control of the head and tape servos (provided by Inter-Sync\*), then time element compensation (provided by AMTEC\*), followed by the final line-by-line correction that Colortec provides.

Colortec is available for all VR-1000 series VIDEO-TAPE\*\* Television Recorder systems that include the accessories just mentioned. VR-1000B and VR-1000A systems require replacement of the Mod/Demod units with Modulator-Video/Demodulator-Video equipment.

### NOTE

*There are additional related considerations involved when VR-1000A systems are to be converted to the Direct Color Process. We invite your inquiry for specific information which will vary with the serial number of the VR-1000A system.*

## DESIGN FEATURES

1. The signal tallies on the Colortec panel indicate the mode of operation (i.e. CTL OFF, H. PHASED, UNPHASED, STD COLOR, or NON-STD COLOR) described above in connection with the Function Selector Switch.
2. The Colortec reproduction of non-standard, or standard NTSC color dubs is always in full color.

\*Trade Mark, AMPEX Corporation

\*\*VIDEOTAPE is the brand name of the Television Recorders made by the AMPEX Corporation

### NOTE

*Non-standard color dubs are recordings of a color signal reproduced by systems equipped with the earlier encode/decode, or heterodyne color processes that preceded Colortec.*

3. In standard color mode the video output signal conforms with the color signal specifications of the Federal Communications Commission, and with the specifications of standard NTSC color. The subcarrier is interlaced, and the appearance of "edge beats" (or lack of sharpness of vertical edges) in the picture is eliminated.
4. While Colortec is operated in H. PHASED mode, and Inter-Sync is in AUTOMATIC mode, the reproduction of a recorded standard NTSC color signal that appears at the Colortec output is fully synchronous in that it is locked vertically, horizontally, and to the reference subcarrier.
5. Colortec continues to present correct color phase and picture hue information in its output signal when there are excessive time base errors in the input signal. Disturbances arising from the passage of a splice do not cause color break-up.
6. The Direct Color Process removes all geometric errors in the reproduced picture signal.
7. The system output signal normally presents color burst that is a filtered product of reproduced burst. In this way the significant ratio between picture chroma and burst levels in the original recording is retained. If for any reason it is desired to replace the reproduced burst with new burst, Colortec provides the facility for its derivation from the reference subcarrier prior to its routing to the Processor.
8. Colortec does not normally reconstitute the composite video color signal. For this reason, system



maladjustments will not cause the alteration of color values.

9. The Colortec output signal retains the full bandwidth and resolution of the original recorded signal.

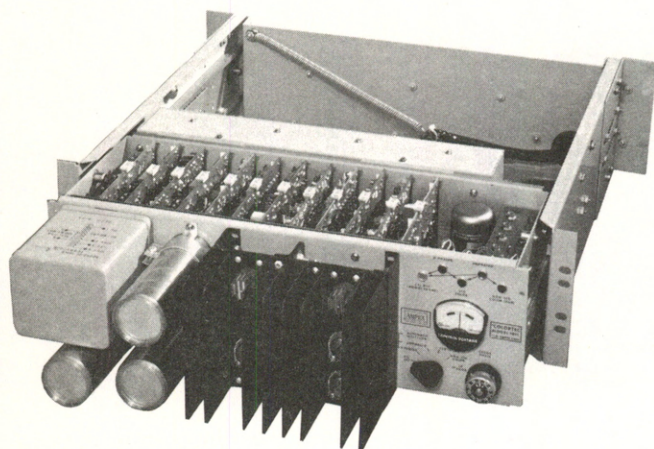


Figure 2. COLORTEC CHASSIS

8093-9

10. Colortec circuitry is engineered for exceptionally dependable and trouble-free operation achieved by the use of conservatively designed solid-state electronics.
11. Colortec requires no adjustments when changing from one tape to another; the two operating controls are used only to adjust the instrument to external operating conditions.
12. Identical dual video outputs facilitate the set-up of the Processor.
13. Colortec occupies only 5¼-inches of rack space, and replaces the formerly required full-rack of color equipment.
14. The drawer slide construction, plug-in etched board design, and improved cable harness folding provide the maximum convenience in gaining access to the equipment.

## DESCRIPTION

### OPERATING CONTROLS

Colortec has but two primary operating controls, both of which are mounted on its front panel. They are described by the following:

#### **Function Selector Switch — (six-positions)**

<i>Position Number</i>	<i>Identity</i>	<i>Function</i>
1	CTL OFF	Control voltage disconnected. Colortec functions only as a unity gain amplifier.
2	H. PHASED	An automatic mode in which the system is fully synchronous with reference sync and with the reference subcarrier. The mode appropriate for monochrome, or for standard NTSC color is automatically selected. The H. PHASED tally, and the selected mode tally are lighted.
3	UNPHASED	An automatic mode in which the system operates unphased to the horizontal reference. The mode appropriate for monochrome, standard NTSC color, or for non-standard color is automatically selected. The UNPHASED tally, and the selected mode tally are lighted.
4	STD. COLOR	A manual mode selected by the switch position, used for reproduction of standard NTSC color signals. The system is not phased to the horizontal reference. The STD COLOR and the UNPHASED tallys are lighted.
5	NON-STD. COLOR	A manual mode selected by the switch position, used for reproduction of non-standard color signals. The system is not phased to the horizontal reference. The NON-STD COLOR, and the UNPHASED tallys are lighted.
6	L.P. FILTER	Control voltage disconnected. A low-pass filter is inserted in the video signal path to remove the color subcarrier components and convert the signal to monochrome. This mode switch setting is used when a non-standard color signal departs beyond the time base correction capability of the system. Only the H. PHASED tally is lighted.

#### **Color Phase Control:**

A continuously variable delay line whose range is from zero to 0.4 microsecond delay. It provides for color phase adjustment of the composite video color output signal to that of the external 3.58 megacycle reference. In this way it permits the phase of the reproduced color

signal to be matched with that of a color camera or other color signal source that is locked to the same reference.

Burst selector switch S002 (located on the test point panel) is a secondary control that permits the choice of burst reproduced from the recording, or of new burst that is derived from the 3.58 mc reference subcarrier.

## SPECIFICATIONS

### Signal Levels

Video Input Signal, 1.0 volt peak-to-peak composite video, sync negative.

Video Output Signal, 1.0 volt peak-to-peak composite video, sync negative.

External Horizontal Reference, 2.5 to 8.0 volts peak-to-peak, negative.

Delayed Horizontal Reference Output, 4.0 volts ( $\pm 10$  percent) peak-to-peak negative pulse, 2 microseconds width, into 75 ohms external load.

External 3.58 mc Subcarrier, 1.0 to 4.0 volts peak-to-peak.

Error Waveform Output. A 1 volt peak-to-peak display is equivalent to 280 nanoseconds  $\pm 5$  percent.

Output Burst, 0.286 volt peak-to-peak.

### Signal Delay at Mid-Range:

3.5 microseconds  $\pm 10$  percent.

### Time Base Compensation

In a properly adjusted VR-1000C system, the following is typical of the performance of Colortec:

1. Total Range of Correction:  
280 Nanoseconds.
2. Total Remaining Timing Error, including all

components of error referred to the external sub-carrier source:

$\pm 4$  Nanoseconds at the end of the burst period.

### Input Impedances

Video Input, 75 ohms  $\pm 2$  percent.

External Horizontal Reference, high impedance bridging.

External 3.58 mc Subcarrier, 75 ohms.

### Output Impedances

Video Output, 75 ohms  $\pm 2$  percent. There are two identical outputs.

Delayed Horizontal Reference, 75 ohms  $\pm 2$  percent.

Color Burst, 75 ohms  $\pm 2$  percent.

Error Waveform Monitor, high impedance.

### Miscellaneous

1. Power Required:  
60 Watts Maximum at 117 Volts ac (50 or 60 cps).
2. Physical Dimensions:  
Height  $5\frac{1}{4}$  inches, Width (at front flange) 19 inches, Width (at rear flange)  $20\frac{1}{2}$  inches, Depth  $16\frac{3}{4}$  inches.
3. Maximum permissible ambient operating temperature,  $+50^{\circ}$  Centigrade.



## CRITERIA OF COLOR SIGNALS REPRODUCTION

The chrominance portion of the NTSC color television signal is modulated on a 3.579545 megacycles subcarrier that has a frequency tolerance of  $\pm 10$  cycles-per-second, a maximum rate-of-change of 0.1 cycle-per-second, and a phase tolerance of  $\pm 10$  electrical degrees.

Analysis of these factors, together with the standard (nominal) relative head-to-tape velocity of 1500 inches-per-second used in the television recorder/reproducer, will show that during reproduction the equivalent instantaneous position of the video heads relative to the tape must be maintained within  $\pm 11.7$  micro-inches of their equivalent instantaneous positions during the making of the recording.

The first step toward this precision of head phase control is taken by Inter-Sync which can achieve an accuracy of  $\pm 150$  micro-inches. The second step is taken by AMTEC, which can achieve an equivalent accuracy of  $\pm 75$  micro-inches. The direct color process offered by Colortec reduces the residual error to an equivalent time error of 0.005 microsecond (5.0 nanoseconds) or less.

Prior to the introduction of Colortec, the recovery of color signals from magnetic tape began with typical timing errors of 10 microseconds, and an equivalent head position error of 0.015 inch. The reproduced chrominance signal required separate processing to stabilize the subcarrier.

While domestic color receivers could reproduce color pictures from the signal, certain of the principal properties of NTSC color were lost. For example, there was no frame interlace of luminance with chrominance components, and instead of the use of a band sharing principle it was necessary to assign the lower part of the band to luminance, and the upper to chrominance information.

### **The Colortec Direct Color Process**

Colortec takes over in the reduction of head-to-tape timing errors where the successive processes of Inter-Sync and AMTEC terminate. While the circuit of Colortec bears some resemblance to that of AMTEC, there are important and significant differences.

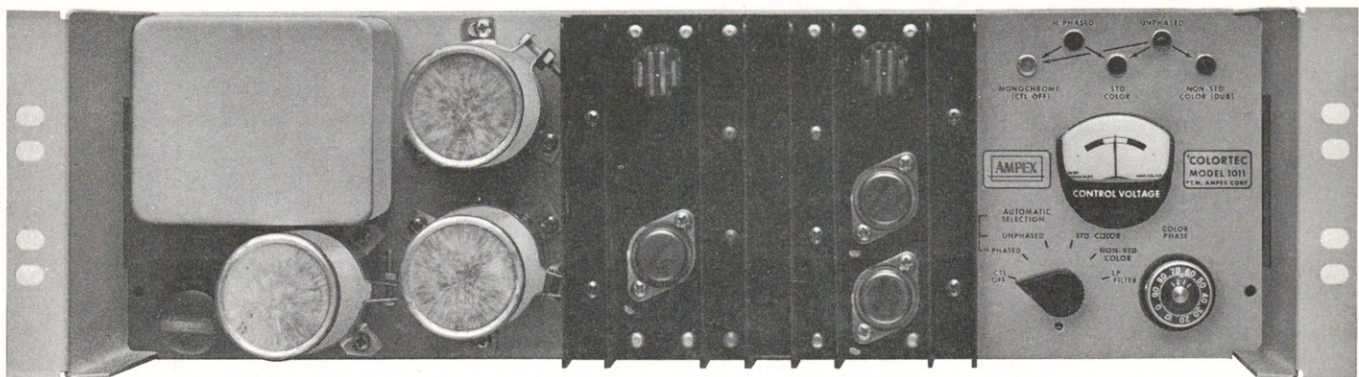


Figure 3. COLORTEC FRONT PANEL

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Colortec uses an electronically controlled variable delay line (as does AMTEC), but its control signal is the result of phase comparison of the reproduced 3.58 mc color burst with the 3.58 mc reference subcarrier. Its video input signal is received from the AMTEC output which may typically contain residual timing errors of 0.05 microsecond referred to the subcarrier. This is equivalent to a head position error of approximately 75 micro-inches.

Occasional reference to the accompanying block diagrams (Figs. 6 and 7) will be an aid to clarification of the discussion of the Colortec Direct Color Process that follows.

Horizontal sync is stripped from the reproduced composite video color signal, and its trailing edge used as the timing reference for the operation of the burst gate. The burst gating pulse begins 0.5 microsecond following the trailing edge of sync, and has a duration of 2.4 microseconds. Thus the burst gate allows only the burst portion of the blanking interval to pass through to the signal waveform generator. The latter produces pulses from the negative-going crossovers of reproduced burst. The repetition rate of the pulses from the output of the signal waveform generator is one-half the burst frequency. These pulses are applied to one input of the error detector.

The 3.579545 mc ( $\pm 10$  cps) reference subcarrier signal is applied to the reference waveform generator, which produces a linear sawtooth waveform that is in-phase with the reference, but whose repetition rate is one-half of its frequency. This sawtooth is applied to the second input of the error detector.

### Error Detector

The pulses received from the signal waveform generator sample the slope of the sawtooth signal received from the reference waveform generator, thus deriving an error voltage whose amplitude is proportional to the phase difference of the compared signals.

This phase comparison is repeated during each burst period; the successive error voltages thus derived are maintained until the next burst interval occurs. The error signal output therefore has continuity, but is corrected during each successive burst interval.

The error detector functions as a 360 degree comparator. (Refer to Figure 5.) This unusual attribute is made possible by causing the reference sawtooth waveform to occur at one-half the subcarrier rate, which in turn permits the occurrence of two crossover pulses during one reference waveform period. Binary logic insures

that the selected sampling pulses are within the limits of the reference sawtooth slope.

By virtue of this sampling range, the comparator action permits stabilization of chrominance in the reproduced color signal despite the presence of system mechanical timing errors that exceed the correction range of AMTEC. Thus the corrected video signal that appears at the output of Colortec is held in-phase with the reference, and home receiver will not lose color lock during the passage of a tape splice, vertical roll, or a large timing error (such as those that might be present in a non-standard color signal).

Following push-pull amplification by the delay line driver, the error output signals are applied to the + and - inputs of the electronically controlled variable delay line.

The video input signal (from AMTEC) is also applied to the video driver which in turn drives the 2.4 microseconds fixed delay line. This fixed delay permits reproduced burst to be phase-corrected by the control voltage that is derived from its phase comparison with the reference (described above). The output of the fixed delay line is applied to the remaining input of the electronically controlled variable delay line, where the final time correction required by the direct color process is made.

Following amplification (by the video amplifier) the time-corrected video signal is normally routed directly to the Colortec output stage. However, a 3.58 mc low pass filter may be inserted (by means of a switch) if a non-standard color signal departs beyond the corrective capability of the System. This filter removes all color subcarrier components from the color signal.

Because the Processor removes burst from the back porch of sync, it is necessary to re-insert burst in its composite video output. Colortec provides for this by stripping burst from its corrected video output by means of a process that is identical with that applied initially to incoming video. This recovered burst is filtered (to remove some of the unwanted noise), and remains fully representative of the original recorded burst in terms of amplitude and phase. It is this reconstituted burst that is routed to the Processor.

If preferred, Colortec also offers the alternative of inserting totally new burst that is derived from the reference subcarrier. This new burst will contain less

residual noise, and have a more symmetrical form, but may not be truly representative of the original tape signal-to-burst relationship.

### Delayed Horizontal Reference

The incoming horizontal reference signal is applied to one input of the horizontal reference variable delay; the control voltage applied to the other input, is the previously mentioned error signal (derived by the error detector) which controls the delay of the output sync. Delayed horizontal reference sync is routed to, and used to govern the Inter-Sync and AMTEC units in the television recorder system.

Delayed horizontal reference sync makes it possible to operate the electronically controlled variable delay line near the middle of its range. The delayed sync, delays the timing of the video signal received to Colortec, and tends to maintain mid-range operation regardless of the phase relationship of subcarrier-to-sync.

### Non-Standard Color Signals Reproduction

The scanning frequency of the NTSC color signal is  $2/455$  of the burst frequency. The record/reproduce systems that preceded NTSC color could not preserve this relationship, which resulted in timing difference between reproduced burst and reproduced sync amounting to as much as  $\pm 20$  microseconds.

In order to reproduce such non-standard color signals, the horizontal reference timing of Colortec is switched to another mode wherein feedback gain is increased, the normal reference horizontal delay is changed (from 2.5 microseconds) to 30 microseconds, and the higher frequency components of the timing error are allowed to modify the reference timing. These modifications of playback mode permit the successful reproduction of second (or later) generation non-standard color recordings that meet the rate-of-change of sync specified by the FCC for monochrome signals.

### Automatic Recognition of Video Signal Type

In the automatic modes Colortec senses the type of video signal that is present (i.e. whether it is monochrome, standard NTSC color, or non-standard color).

When a monochrome signal is present, a fixed voltage is applied to the electronically controlled variable signal delay line, and Colortec then functions as a unity gain amplifier.

### 360 Degree Phase Comparator

The three previously mentioned major elements of the 360 degree phase comparator are more fully described by its accompanying block diagram. (Fig. 10)

The incoming 3.579545 mc ( $\pm 10$  cps) subcarrier is routed through a variable phase shifter, a limiter, and to a crossover detector. The latter passes only the negative-going axis crossovers of the subcarrier, resulting in a train of pulses whose leading edges are spaced at 279 nanoseconds intervals.

The crossover detector output is routed by two paths. By one path it is applied to an input of the reference AND gate; by the other it is routed through a 70 nanoseconds delay, and then to a binary frequency divider.

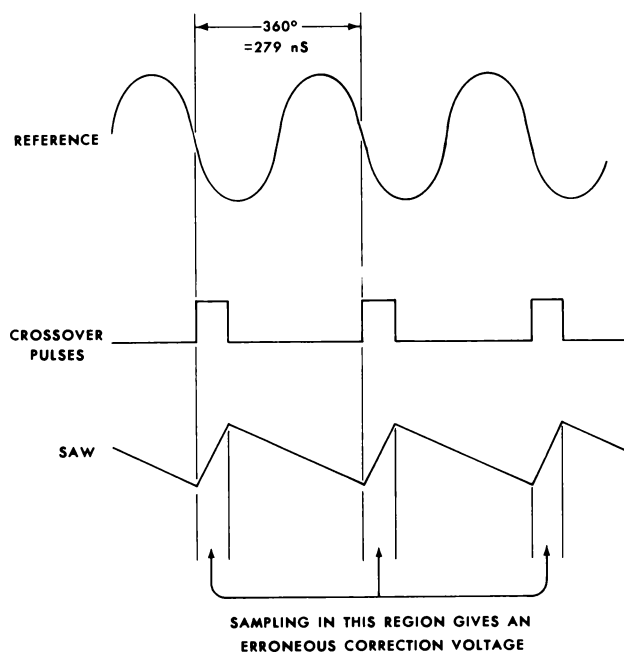


Figure 4. WAVEFORM DIAGRAM FULL-RATE COMPARATOR (RANGE LESS THAN 360°) 50 107

The binary output is a symmetrical square wave whose repetition rate is one-half that of the subcarrier. Thus its leading edges are separated in time by 558 nanoseconds (i.e.  $279 \times 2$  nanoseconds). This output is applied to the other input of the reference AND gate (and to the divider AND gate which will be discussed later). The reference AND gate opens only when there is coincidence of the gating pulses from the crossover detector with the square wave from the binary. Its output is thus a series of pulses whose leading edges are

separated in time by 558 nanoseconds, and whose widths are those of the gating pulses from the crossover detector.

The reference AND gate output pulses are applied to the reference waveform generator, which forms them into a linear sawtooth waveform whose wavelength is 558 nanoseconds. This sawtooth is applied to one input of the error detector.

Burst gated from the tape video signal is filtered, limited, and applied to a second crossover detector. The output of the latter is a series of pulses whose leading edges are separated in time by 279 nanoseconds. These pulses are routed through a 70 nanoseconds delay to the signal AND gate.

The crossover detector output is also routed to the divider AND gate mentioned parenthetically above. The divider AND gate requires the coincidence of three signals to open. The third signal is the burst gate pulse which is shaped to a pulse of 2.4 microseconds duration by the second gate pulse former.

The output of the divider AND gate is a series of pulses whose leading edges are separated 558 nanoseconds in time, and which continue to occur for a 2.4 microseconds period. These pulses trigger a 500 nanoseconds (minimum repetition period) one-shot multi-vibrator whose output is a series of 200 nanoseconds pulses whose leading edges occur 558 nanoseconds apart.

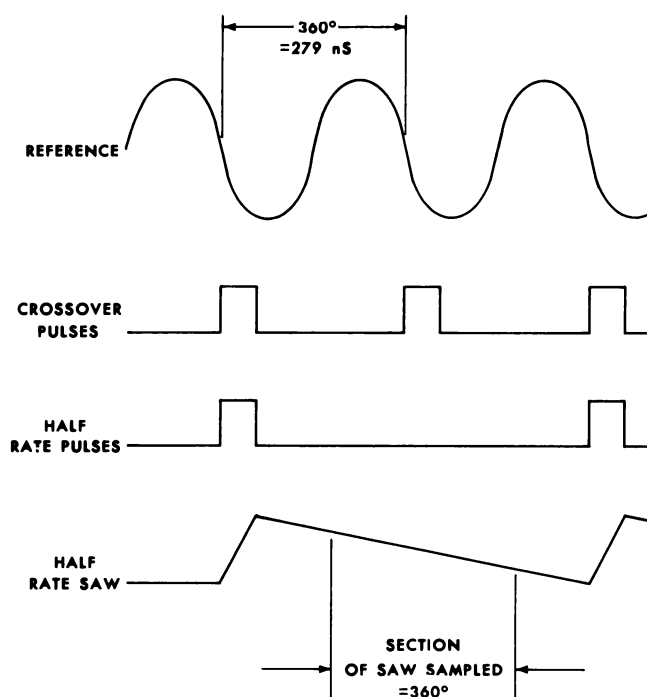
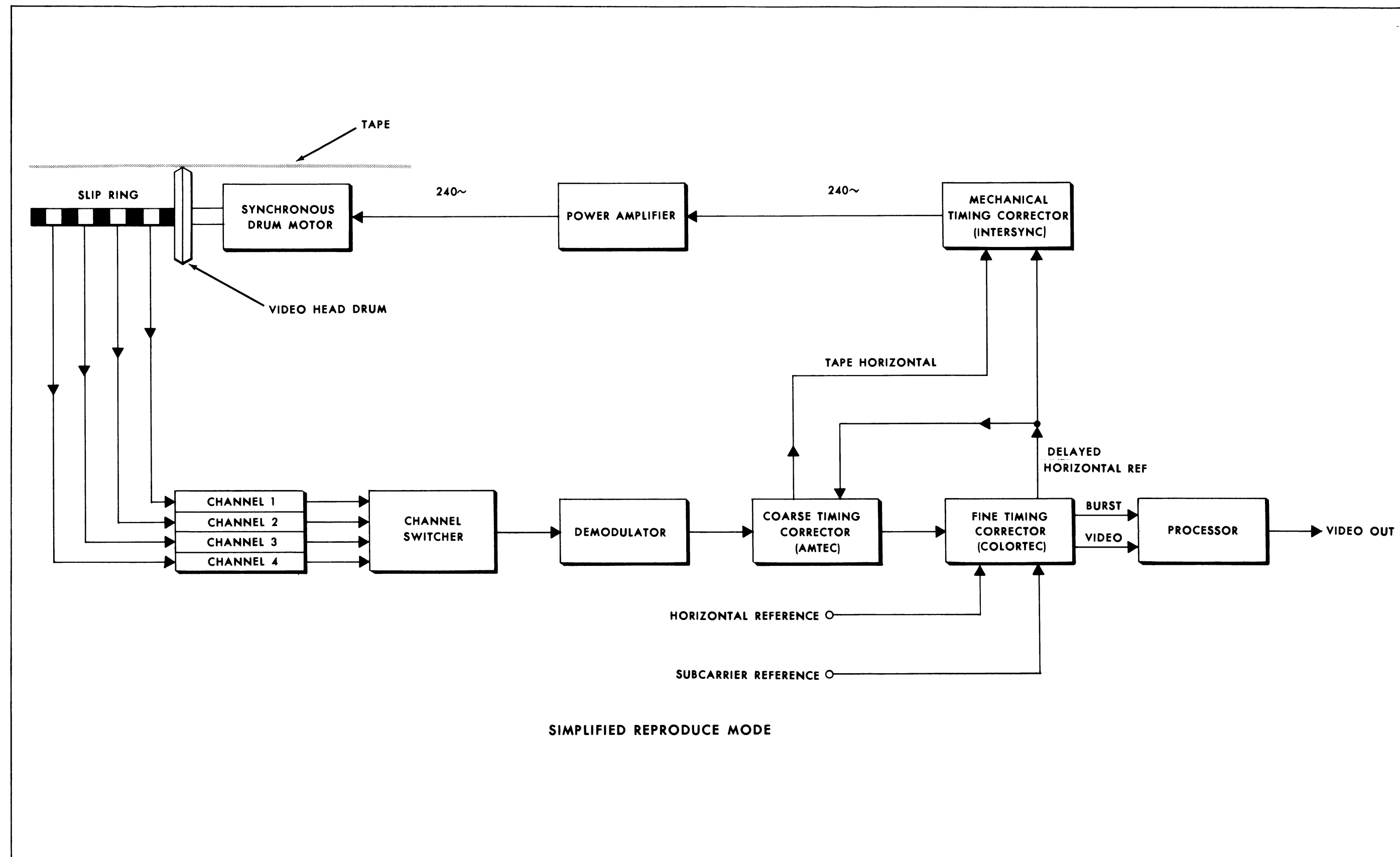


Figure 5. WAVEFORM DIAGRAM HALF-RATE 360° COMPARATOR (USED BY COLORTEC) 50108

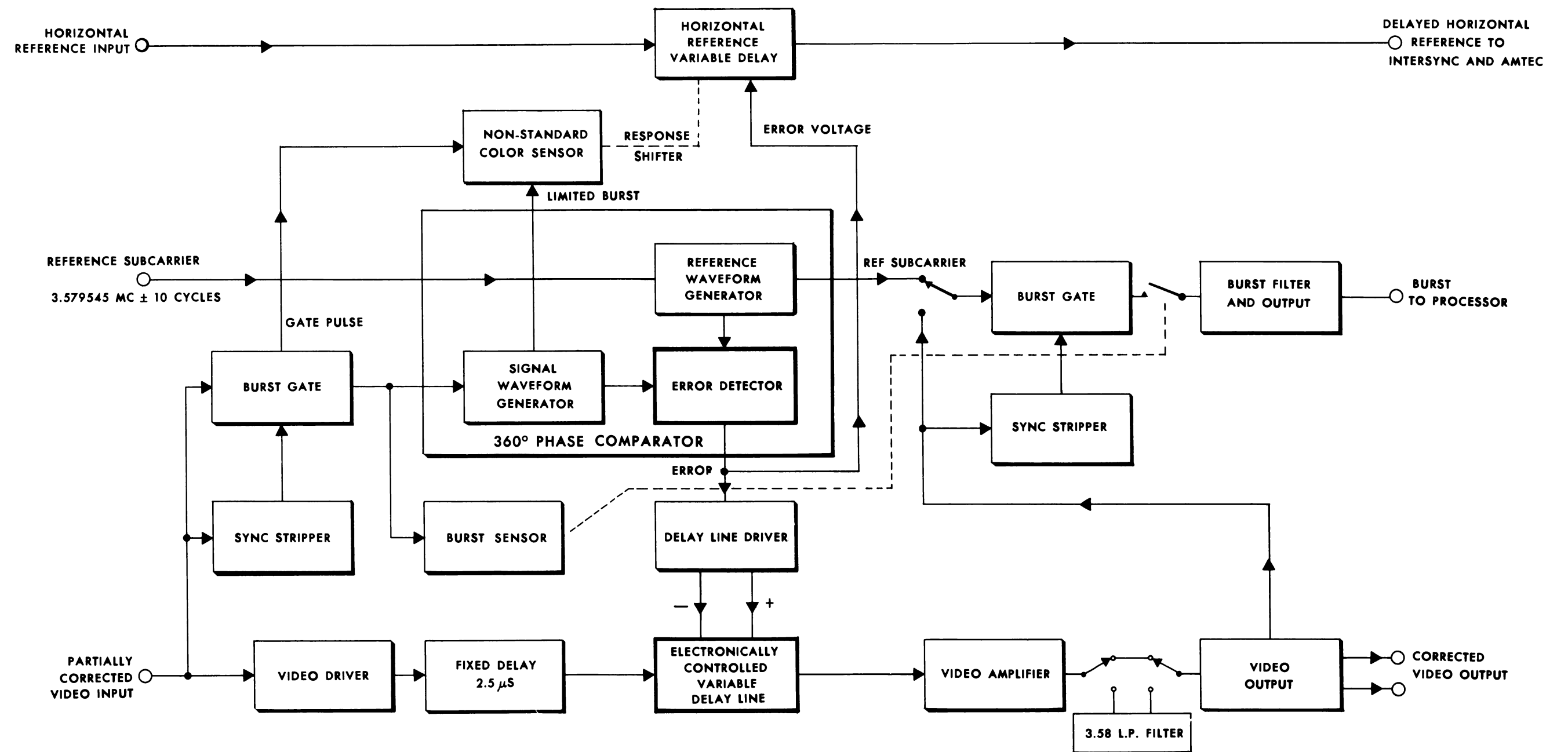
These pulses are routed to the second input of the signal AND gate.

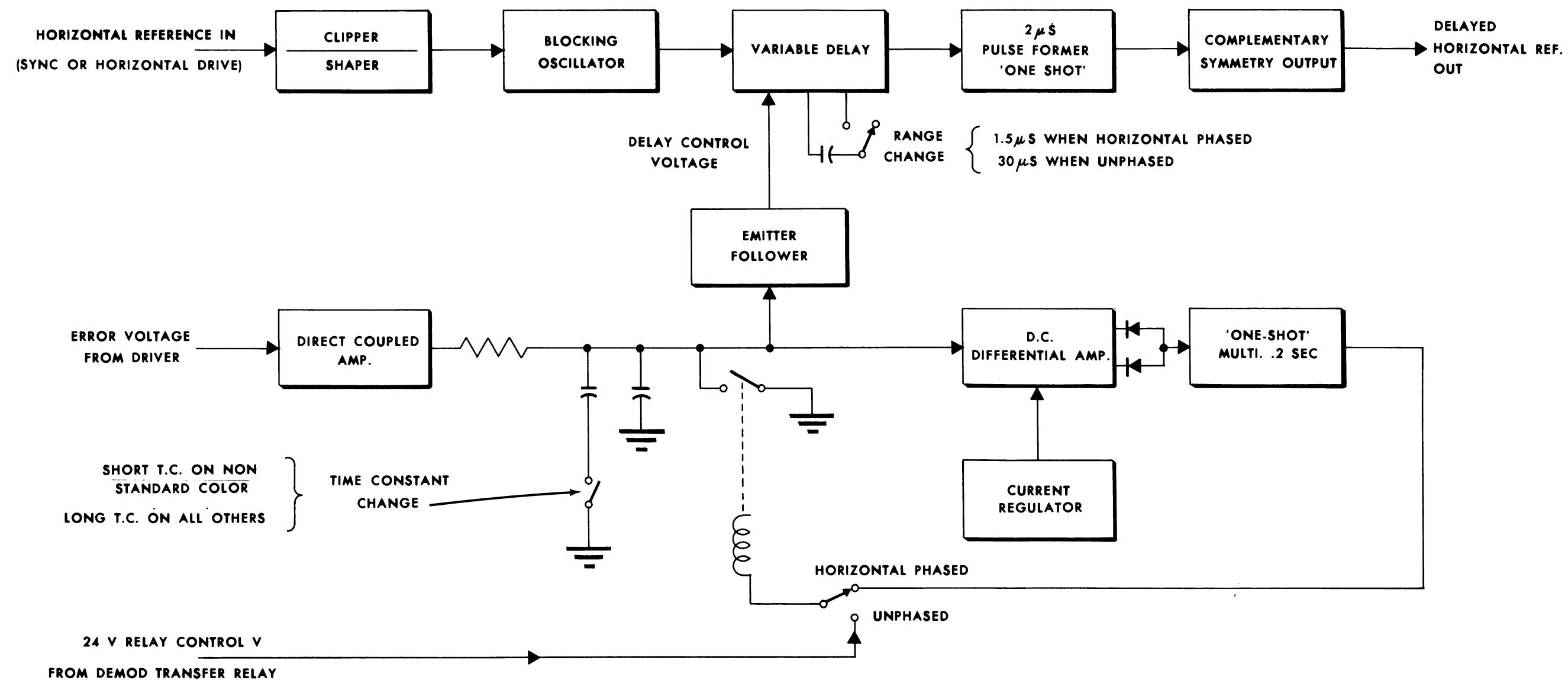
The output of the signal AND gate (a series of narrow pulses, 558 nanoseconds from leading edge to leading edge) is applied to the sampling pulse generator whose output is applied to the second input of the error detector.

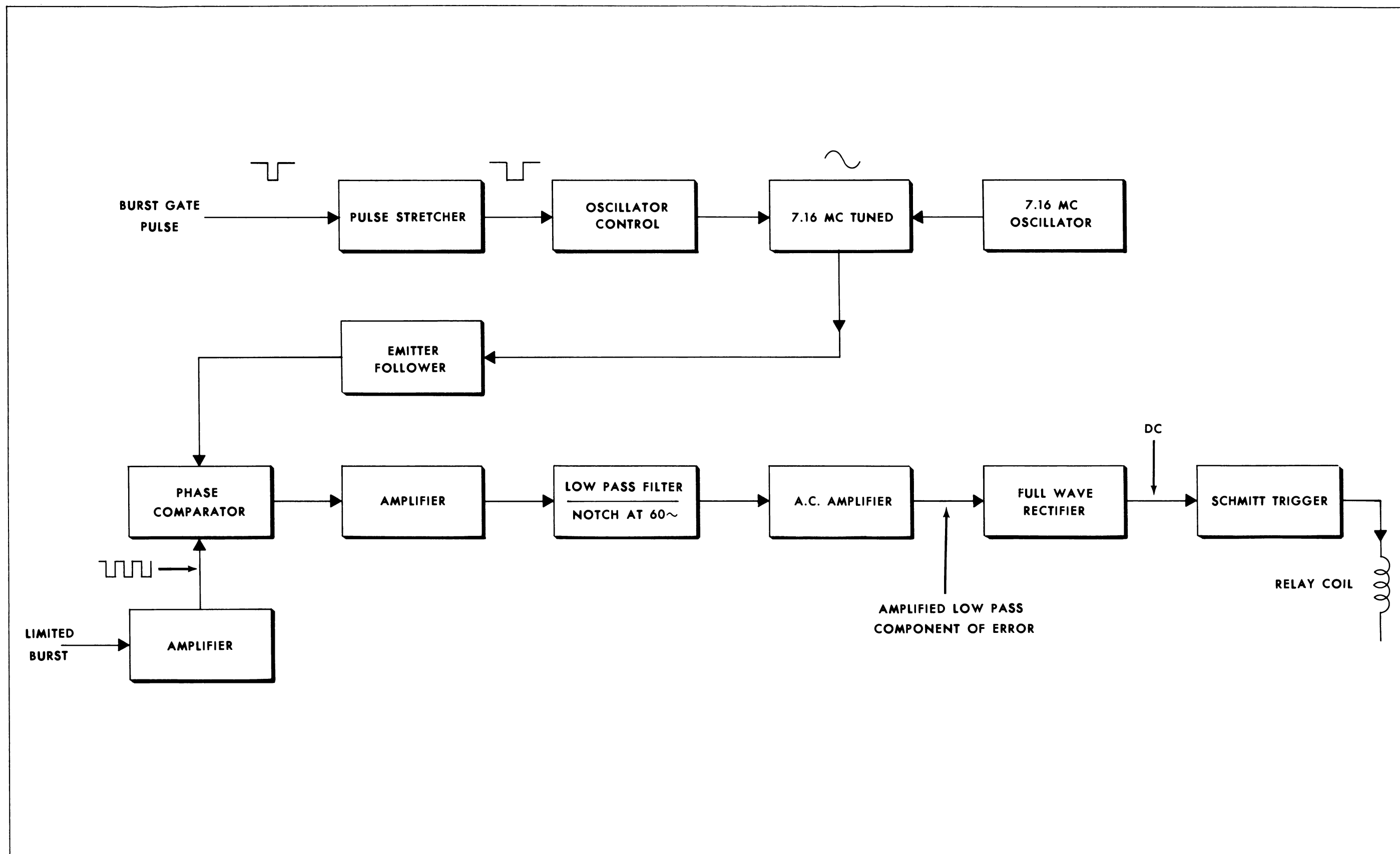


SIMPLIFIED REPRODUCE MODE



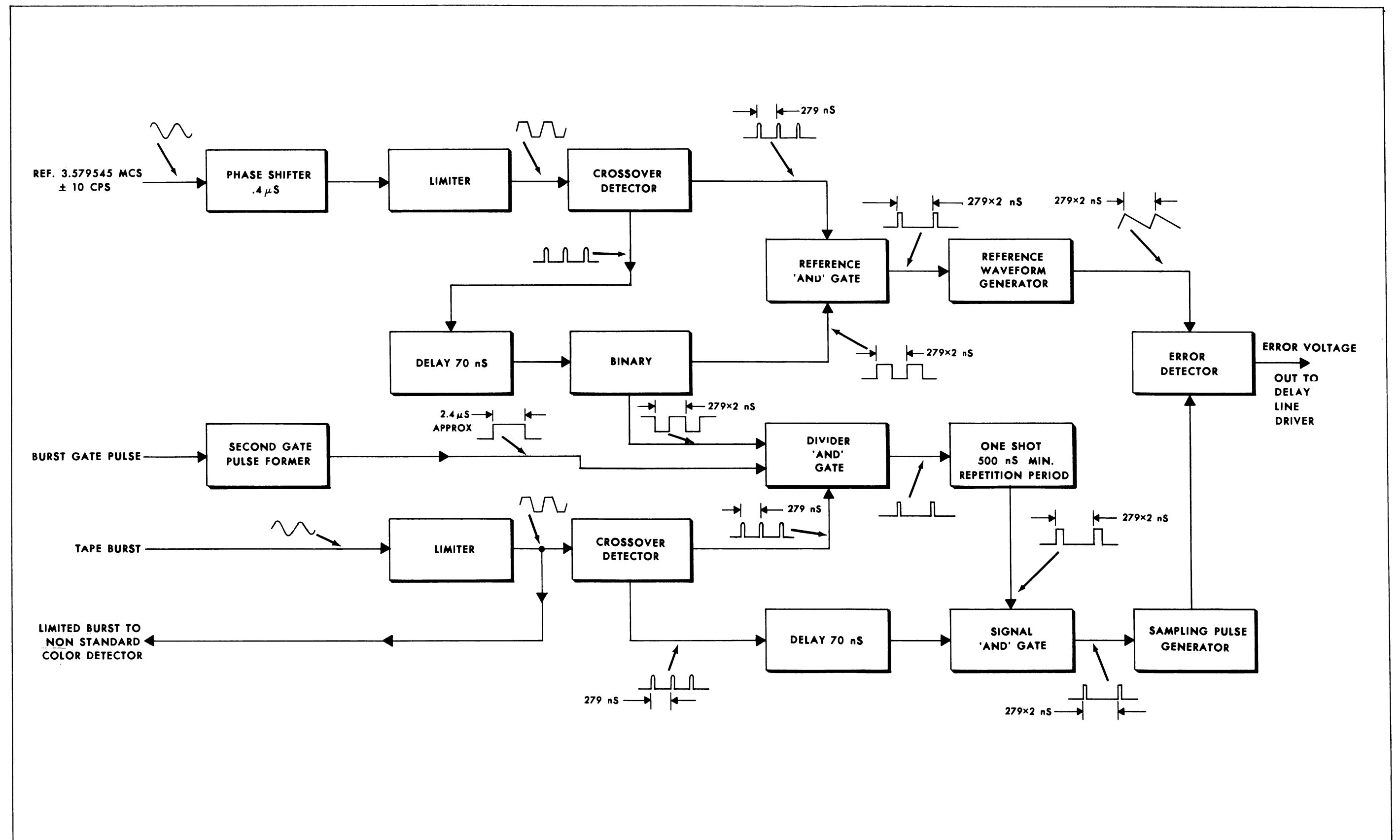






50112

Figure 9. BLOCK DIAGRAM  
NON STANDARD COLOR DETECTOR



50113

Figure 10. 360° PHASE COMPARATOR

# COLORTEC INSTALLATION IN VR-1002 SYSTEMS

## GENERAL

The installation of Colortec in VR-1002 systems requires the following:

1. The Processor (catalog number 51450-07, 08) must be modified to the -12 version. The detailed procedure for this modification appears in the re-print of Field Engineering Bulletin F202-1 which is included in this manual at the end of the Installation section.
2. The Inter-Sync unit in the system must be equipped with the electronic resolver (rather than the mechanical resolver). The earlier -01, -02, and -03 versions of Inter-Sync may be modified to the -04 version, or may be replaced by the current -05 version. Both of the latter contain the electronic resolver.

## Procedure

### Step 1:

Mount the Colortec chassis in rack 2 of the Electronics Cabinet, immediately below the AMTEC chassis. It will be found necessary to remove the rear brackets on the Colortec chassis in order to place it in position.

### Step 2:

While holding the Colortec side brackets level, mark and drill a  $\frac{3}{16}$ -inch diameter mounting hole in both rear columns of rack 2. Fasten the Colortec chassis (in the level position) using two 8-32 machine screws, hexagon nuts, and lockwashers.

### Step 3:

Transfer the harness connector from J008s EXT. REF. SYNC IN (on the AMTEC chassis), to J10s H. REF. IN on the Colortec chassis. It may prove necessary to lengthen the coaxial cable.

### Step 4:

Transfer the harness connector from J1s 3.58 MC INPUT (on the Processor chassis), to J4s 3.58 REF IN on the Colortec chassis. Partial removal of this coaxial cable from the harness will provide sufficient length.

### Step 5:

Disconnect the harness connector from J2s (on the Relay Box between the racks at the rear of the Electronics Cabinet); disconnect the opposite end of this cable from J1s on the AMTEC Bypass Relay. Insulate and tie back both connectors.

### Step 6:

Transfer system wire #283 from terminal board TB-K11, to TB-19. Partial removal of this wire from the harness will provide sufficient length.

### Step 7:

Disconnect and remove any cables that are connected between the connectors listed in the following table, and install new cables made with Belden #8281 or equivalent low capacitance cable. In each instance use the shortest length of cable that will reach both connectors by the direct route.

### Suggested

Length (Feet)	From	To
4½	Relay Box	J2s AMTEC Bypass Relay J1s
4	Relay Box	J3s Colortec J2s
6	Relay Box	J4s Terminal Board TB-J1
4	Relay Box	J6s Demodulator-Video J7s
4	Relay Box	J7s Modulator-Video J3s
3	Relay Box	J8s Processor J11s
3	AMTEC Bypass Relay	J2s AMTEC Chassis J2s
3	AMTEC Bypass Relay	J3s AMTEC Chassis J3s



3	AMTEC Bypass Relay	J8s	Colortec	J1s
6	Processor	J4s	Terminal Board	TB-J2
	Colortec	J3s	Terminal Board	TB-J4
	Relay Box	J1s	Terminal Board	TB-J3
	Relay Box	J5s	Processor	J5s

**Step 8:**

Install new coaxial cables (made with RG-59/U, or equivalent) between the connectors listed in the following table. Disconnect any cables already attached to these connectors.

*Suggested*

<i>Length (Feet)</i>	<i>From</i>	<i>To</i>
6½	AMTEC	J8s Inter-Sync J16s
2½	AMTEC	J9s Colortec J9s
6	Colortec	J5s Processor J1s
3	Colortec	J11s AMTEC Bypass Relay J5s
6	Colortec	J12s Terminal Board TB-J11

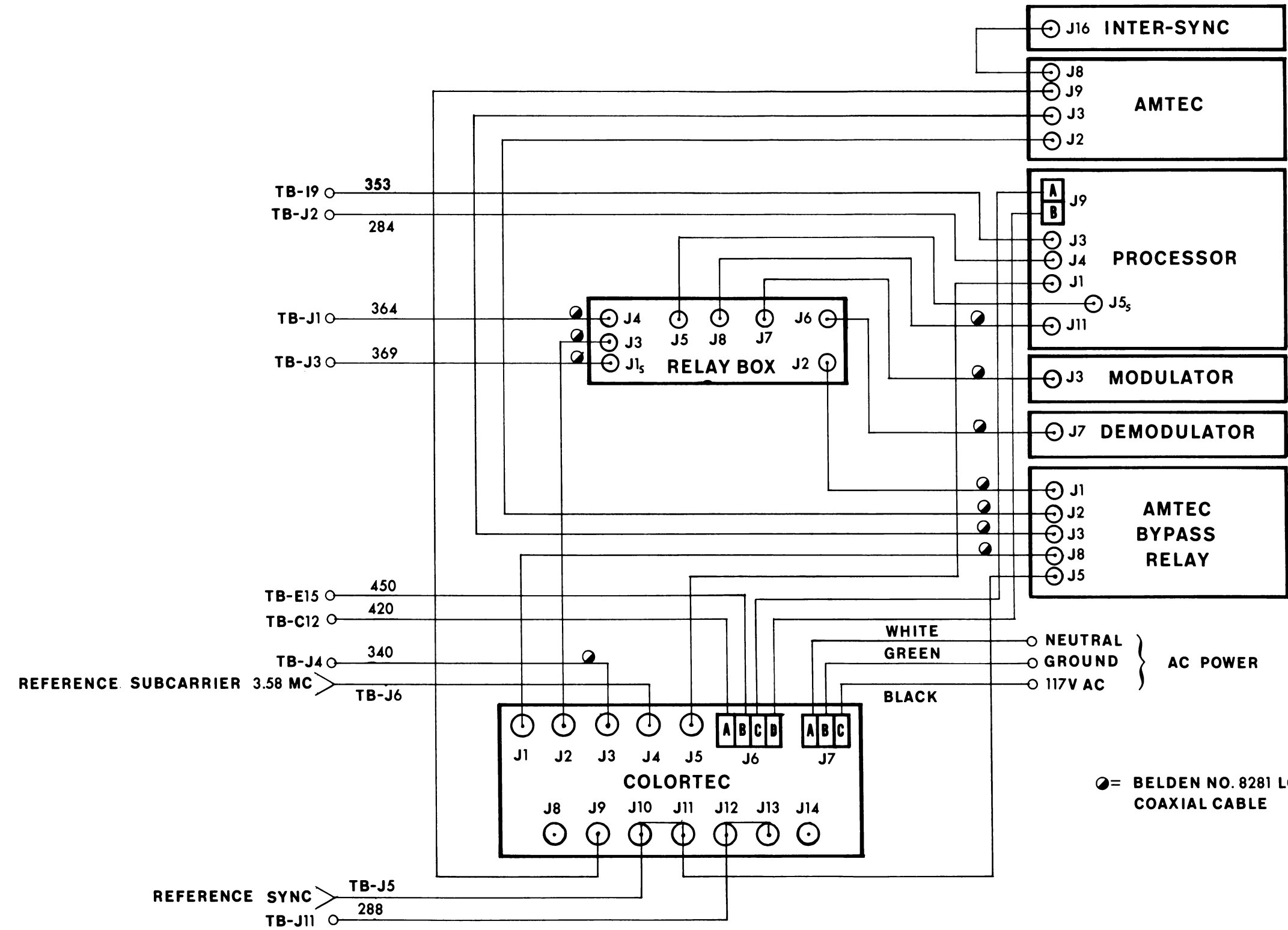
**Step 9:**

Install new relay control wires between the connection points listed in the following table.

<i>From</i>		<i>To</i>	
Colortec	J6p-A	Terminal Board	TB-C12
Colortec	J6p-B	Terminal Board	TB-E15
Colortec	J6p-C	Processor	J9p-A
Colortec	J6p-D	Processor	J9p-B

**Step 10:**

Attach a 3-conductor 18 B&S power cable to furnished Cannon connector J7p. Connect the neutral (black wire) to pin C, the ground (green wire) to pin B, and the 115 volts ac (white wire) to pin A. Insert cable connector J7p at J7s AC 1N on the Colortec chassis; connect the opposite end of the cable to incoming ac power and system ground by the color code just given.



## COLORTEC INSTALLATION IN VR-1000C SYSTEMS

### GENERAL

The installation of Colortec in VR-1000C systems requires the following:

1. The Processor (catalog number 51450-07, 08) must be modified to the -12 version. The detailed procedure for this modification appears in the re-print of Field Engineering Bulletin F202-1 which is included in this manual at the end of the Installation section.
2. The Inter-Sync unit in the system must be equipped with the electronic resolver (rather than the mechanical resolver). The earlier -01, -02, and -03 versions of Inter-Sync may be modified to the -04 version, or may be replaced by the current -05 version. Both of the latter contain the electronic resolver.

### Procedure

#### Step 1:

Temporarily disconnect and remove Power Supply B, the Modulator-Video, and the Demodulator-Video from the top of Rack 2.

#### Step 2:

Mount the Colortec chassis in Rack 2 immediately above the Guide Position Sensor. It will be necessary to tilt the Colortec chassis to permit its rear brackets to pass through the Rack.

#### Step 3:

While holding the Colortec side brackets level, mark and drill a  $\frac{3}{16}$ -inch diameter mounting hole in both rear columns of Rack 2. Fasten the Colortec chassis (in the level position) using two 8-32 machine screws, hexagon nuts, and lockwashers.

#### Step 4:

Re-install and connect the Demodulator-Video, the

Modulator-Video, and Power Supply B, in succession, above the Colortec chassis. The blank panel at the top of Rack 2 may be removed to make way for the Power Supply, with which it will interfere.

#### Step 5:

Transfer cable #366 from J8 (on the AMTEC chassis), to J10s, H. REF IN on the Colortec chassis. Remove the cable extension to shorten it.

#### Step 6:

Disconnect cable #291 from J11 (on the Processor chassis). Insulate the connector and tie it back.

#### Step 7:

Transfer cable #270 from J1 (on the Processor chassis) to J4s 3.58 REF. IN on the Colortec chassis. Partial removal of this cable from the harness will provide sufficient length.

#### Step 8:

Transfer wire #283 from terminal board TB-K11, to TB-I9. Partial removal of this wire from the harness will provide sufficient length.

#### Step 9:

Install new coaxial cables (made with RG-59/U or equivalent) between the connectors listed in the following table. Disconnect any cables already attached to these connectors.

*Suggested  
Length  
(feet)*

	<i>From</i>	<i>To</i>
6	Colortec	J5s Processor J1
5	Colortec	J9s AMTEC J9
3½	Colortec	J11s AMTEC Bypass Relay J5
8	Colortec	J12s Terminal Board TB-J11
5	Inter-Sync	J11 Terminal Board TB-J10
8½	Inter-Sync	J16 AMTEC J8

**Step 10:**

Disconnect and remove any cables that are connected between the connectors listed in the following table, and install new cables made with Belden #8281 or equivalent low-capacitance cable. In each instance use the shortest length of cable that will reach both connectors by the direct route.

**Suggested  
Length**

<i>(feet)</i>	<i>From</i>	<i>To</i>
5	Modulator-Video J3	Terminal Board TB-J1
7	AMTEC Bypass Relay J1	Demodulator-Video J7
5	AMTEC Bypass Relay J2	AMTEC chassis J2
5	AMTEC Bypass Relay J3	AMTEC chassis J3
2	AMTEC Bypass Relay J8	Colortec J1
3	Colortec J2	Processor J11
5½	Processor J4	Terminal Board TB-J2
5½	Processor J5	Terminal Board TB-J3
	Colortec J3	Terminal Board TB-J4

**Step 11:**

Install new relay control wires between the connection points listed in the following table.

<i>From</i>	<i>To</i>
Colortec J6-A	Terminal Board TB-C12
Colortec J6-B	Terminal Board TB-E15
Colortec J6-C	Processor J9-A
Colortec J6-D	Processor J9-A

**Step 12:**

Attach a 3-conductor 18 B&S power cable to furnished Cannon connector J7p. Connect the neutral (black wire) to pin C, the ground (green wire) to pin B, and the 115 volts ac (white wire) to pin A. Insert cable connector J7p at J7s AC IN on the Colortec chassis; connect the opposite end of the cable to incoming ac power and system ground by the color code just given.





# COLORTEC INSTALLATION IN VR-1001A SYSTEMS

## GENERAL

The installation of Colortec in VR-1001A systems requires the following:

1. The Processor (catalog number 51450-07, 08) must be modified to the -12 version. The detailed procedure for this modification appears in the re-print of Field Engineering Bulletin F202-1 which is included in this manual at the end of the Installation section.
2. The Inter-Sync unit in the system must be equipped with the electronic resolver (rather than the mechanical resolver). The earlier -01, -02, and -03 versions of Inter-Sync may be modified to the -04 version, or may be replaced by the current -05 version. Both of the latter contain the electronic resolver.
3. A hinged frame (to be mounted at the rear of the Transport Cabinet) provides rack space for Power Supplies "A" and "B", thus making space available in the Electronics Cabinet for the installation of Colortec.

## HINGED FRAME ASSEMBLY

The Hinged Frame Assembly must be mounted on the left, in the top opening at the rear of the VR-1001A Transport Cabinet. It will be used as a hinged rack support for the 250 Volt Power Supplies, which must be removed from the Electronics Cabinet to make room for Colortec. During the installation of AMTEC, Power Supply "A" was removed from rack 1, and placed elsewhere. The addition of the Hinged Frame provides a mounting for it, and for Power Supply "B."

The Hinged Frame is shipped assembled except for mounting hardware. The items of the later are listed as follows:

<i>Item Number</i>	<i>Description</i>	<i>Part Number</i>
2	Steel Bracket, 1/8-inch thickness	— —
4	Aluminum Top Spacer, 7/16-inch thickness	— —
5	Aluminum Bottom Spacer, 1/8-inch thickness	— —
6	Steel Chain Bracket	— —
9	1/4-20x5/8-inch Hex. Head Machine Bolt	471-012
10	1/4-20x1-inch Hex. Head Machine Bolt	— —
11	1/4-20x1 1/4-inch Hex. Machine Bolt	— —
15	1/4-inch Steel Lockwasher	502-006
23	1/4-20 Steel Hexagon Nut	492-012

## Hinged Frame Procedure

### Step 1:

Saw out the two left-hand gussets in the upper rear opening of the Tape Transport Cabinet, to leave the left corners of the opening unobstructed, and bounded by the cabinet frame. (Refer to Figure 12a.)

### Step 2:

The Hinged Frame Assembly is to be installed in the opening cleared in Step 1. Orient the Frame to place its hinged edge at the bottom, close the hinge, and insert the Frame in the opening, positioning its left edge about 1/16-inch from the left side-frame of the cabinet (see Figure 12b). Rest the Frame on the upper edge of the cabinet cross-frame (see Figure 12a). Open the hinge to place its rear surface in contact with the outer surface of the cross-frame. Using the hinge as a template, mark and drill five 5/32-inch diameter holes. (Remove the Hinged Frame while drilling the holes.)

### Step 3:

Insert a 1/4-20 x 5/8-inch hex head bolt (item 9) in each of the drilled holes. Orient the 1/8-inch aluminum bottom spacer (item 5) horizontally, and align its holes with bolts number 2, 3, 4, and 5 (refer Fig-

ure 12b), and place it against the inside surface of the cabinet cross-frame (refer Figure 13.)

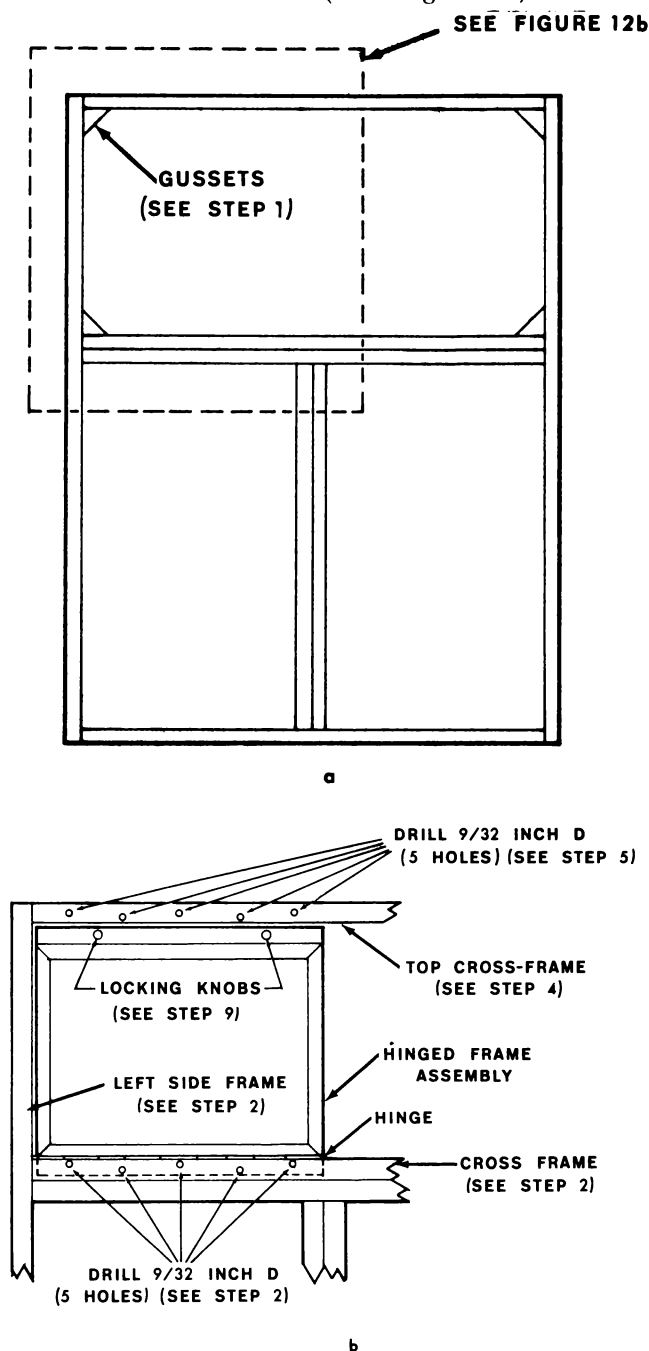


Figure 13. HINGED FRAME INSTALLATION 50116

**Step 4:**

Place the Hinged Frame in the cabinet opening, align the holes in the open half of the hinge with the bolts and insert them. Fasten securely, using five lock-washers (item 15), and hexagon nuts (item 23). Determine that the Hinged Frame swings clear of the

cabinet left sideframe. Mark the extended left edge of the Hinged Frame on the surface of the top cross-frame. Swing the Hinged Frame outward and down.

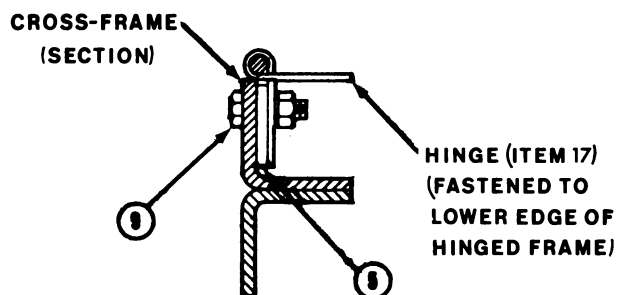


Figure 14. ASSEMBLY DETAIL 50117

**Step 5:**

Orient the  $\frac{3}{16}$ -inch aluminum top spacer (item 4) horizontally, with its stepped surface facing away from the cabinet. Place it on the outer surface of the top cross-frame with its left (stepped) end at the mark made in Step 4, and its lower edge flush with the lower edge of the top cross-frame. Using the spacer as a template, mark and drill five  $\frac{9}{32}$ -inch diameter holes in the top cross-frame.

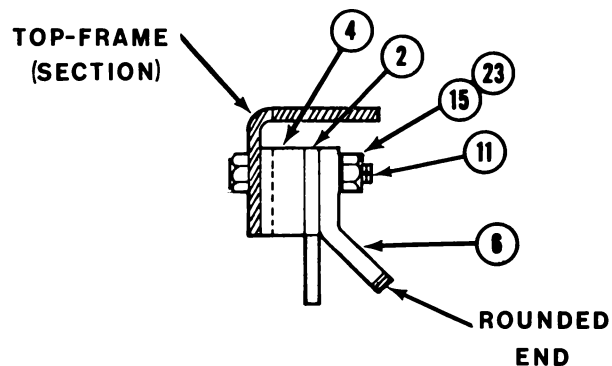


Figure 15. ASSEMBLY DETAIL 50118

**Step 6:**

Insert a  $\frac{1}{4}$ -20 x  $1\frac{1}{4}$ -inch hex head machine bolt (item 11) in holes number 1 and 5; insert a  $\frac{1}{4}$ -20 x 1-inch bolt (item 10) in holes number 2, 3, and 4 (refer to Figure 12b). Align the holes in the stepped surface of the spacer (item 4) with the bolts, and place it against the inside surface of the top cross-frame (refer to Figure 14).

**Step 7:**

Position the  $\frac{1}{8}$ -inch steel bracket (item 2) horizontally, with its notched edge downward, and place it over the bolts. Place a chain bracket (item 6) over each of bolts number 1 and 5, and position each with

its rounded end downward (refer to Figure 14). Fasten the assembled pieces using a lockwasher (item 15), and a hexagon nut (item 23) on each bolt.

**Step 8:**

Attach the "O" link at the end of each chain (pre-attached to the hinged frame) to the chain brackets mounted in Step 7. Determine that the chains support the hinged frame when it is lowered to the horizontal position.

**Step 9:**

Raise and close the hinged frame against the extending surface of the steel bracket (item 2, installed in Step 7). Turn the locking knobs (refer to Figure 12b), and determine that the frame may be locked firmly in the vertical position.

**Colortec Procedure**

**Step 10:**

Disconnect and remove 250 volt Power Supply "B" from rack 2 of the Electronics Cabinet. Install the Power Supply at the lowest position on the Hinged Frame (at the rear of the Transport Cabinet). Install Power Supply "A" (removed from rack 1 of the Electronics Cabinet during the installation of AMTEC) above Power Supply "B".

**Step 11:**

Connect the output of Power Supply "A" to terminal board TB68002 terminals 12 and 14 (on the console termination assembly in the Transport Cabinet); connect the output of Power Supply "B" to TB68002 terminals 16 and 17.

**NOTE**

*These connections route the outputs of Power Supplies "A" and "B" to TB-A13/14, and TB-B1/2 in racks 1 and 2 respectively.*

**Step 12:**

Connect J2p AC POWER (on each Power Supply) to convenient outlets on the power duct.

**Step 13:**

Connect TB-A13/14 to rack 1 harness connector J48002s pins 1 and 8 respectively.

**NOTE**

*This routes the output of Power Supply "A" to the Capstan Signal Generator, from which it is jumpered to other chassis in rack 1.*

**Step 14:**

Connect TB-B1/2 to rack 2 harness connector J94005s pins 1 and 8 respectively.

**NOTE**

*This routes the output of Power Supply "B" to the Inter-Sync Framing chassis from which it is jumpered to other chassis in rack 2.*

**Step 15:**

Disconnect and remove the Modulator-Video, and the Demodulator-Video from rack 2.

**Step 16:**

Mount the Colortec chassis in rack 2 immediately above the Guide Positioner Sensor. It will be necessary to tilt the Colortec chassis to permit its rear brackets to pass through the rack.

**Step 17:**

While holding the Colortec side brackets level, mark and drill a  $\frac{3}{16}$ -inch diameter mounting hole in both rear columns of rack 2. Fasten the Colortec chassis (in the level position) using two 8-32 machine screws, hexagon nuts, and lockwashers.

**Step 18:**

Re-install and connect the Demodulator-Video, and the Modulator-Video in succession above the Colortec chassis.

**Step 19:**

Transfer cable #270 from J1 (on the Processor chassis), to J4s 3.58 REF. IN on the Colortec chassis. Partial removal of this cable from the harness may provide sufficient length. If it does not, use a coaxial barrel and an extender cable.

**Step 20:**

Transfer cable #366 from J5 (on the AMTEC Bypass Relay), to J10s H. REF. IN on the Colortec chassis. Partial removal of this cable from the harness will provide sufficient length.

**Step 21:**

Connect station reference sync to terminal board TB-J5.

**NOTE**

*Cable #366 originates at TB-J5.*

**Step 22:**

Transfer wire #283 from terminal board TB-K11, to TB-I9. Partial removal of this wire from the harness will provide sufficient length.

**Step 23:**

Disconnect cable #291 from J3 (on the AMTEC Bypass Relay). Insulate the connector and tie it back.

**Step 24:**

Disconnect and remove any cables that are attached between the connectors listed in the following table, and install new cables made with Belden #8281 or equivalent low-capacitance cable. In each instance use the shortest length of cable that will reach both connectors by the direct route.

*Suggested Length (feet)*

	<i>From</i>		<i>To</i>	
5	Modulator-Video	J3	Terminal Board	TB-J1
7	AMTEC Bypass Relay	J1	Demodulator-Video	J7
5	AMTEC Bypass Relay	J2	AMTEC chassis	J2
5	AMTEC Bypass Relay	J3	AMTEC chassis	J3
2	AMTEC Bypass Relay	J8	Colortec	J1
3	Colortec	J2	Processor	J11
5½	Processor	J4	Terminal Board	TB-J2
5½	Processor	J5	Terminal Board	TB-J3
	Colortec	J3	Terminal Board	TB-J4

**Step 25:**

Install new coaxial cables (made with RG-59/U, or equivalent) between the connectors listed in the fol-

lowing table. Disconnect any cables already attached to these connectors.

*Suggested Length (feet)*

	<i>From</i>		<i>To</i>	
6	Colortec	J5s	Processor	J1
5	Colortec	J9s	AMTEC	J9
3½	Colortec	J11s	AMTEC Bypass Relay	J5
8	Colortec	J12s	Terminal Board	TB-J11
8½	Inter-Sync	J16	AMTEC	J8

**Step 26:**

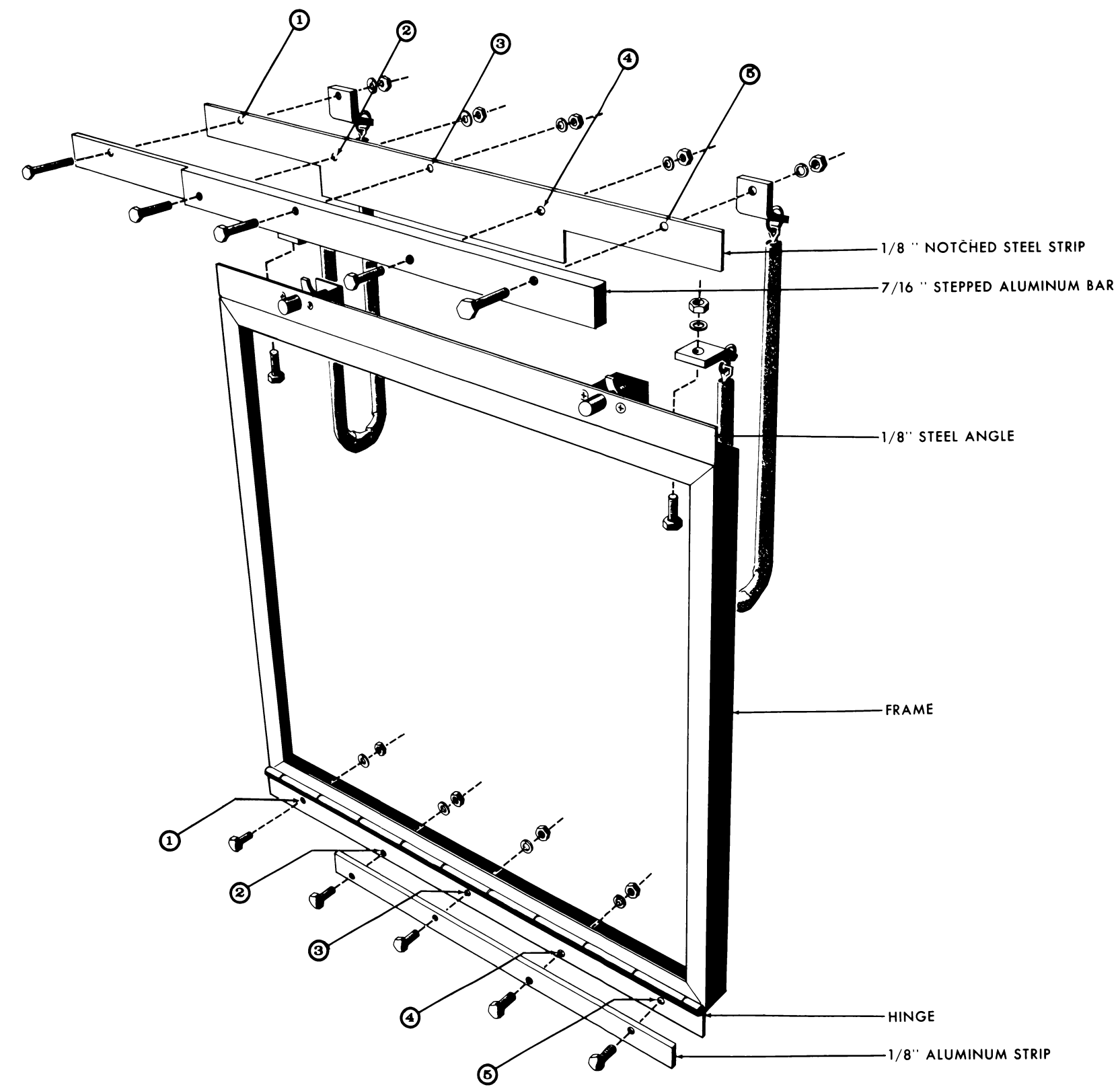
Install new relay control wires between the connection points listed in the following table.

<i>From</i>		<i>To</i>	
Colortec	J6-A	Terminal Board	TB-C12
Colortec	J6-B	Terminal Board	TB-E15
Colortec	J6-C	Processor	J9-A
Colortec	J6-D	Processor	J9-B

**Step 27:**

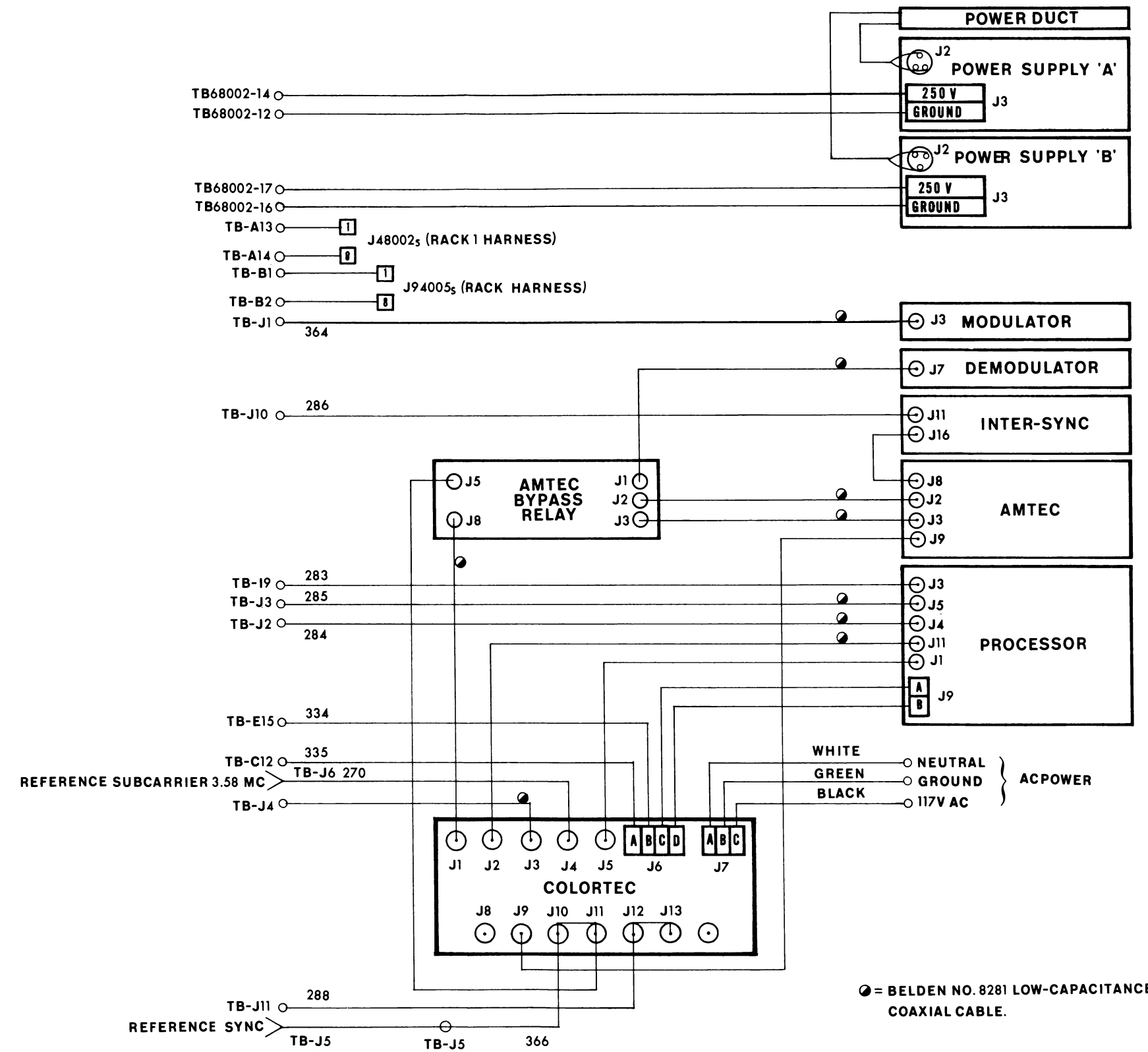
Attach a 3-conductor 18 B&S power cable to furnished Cannon connector J7p. Connect the neutral (black wire) to pin C, the ground (green wire) to pin B, and the 115 volts ac (white wire) to pin A. Insert cable connector J7p at J7s AC IN on the Colortec chassis; connect the opposite end of the cable to incoming ac power and system ground by the color code just given.





50119

Figure 16. EXPLODED VIEW  
HINGED FRAME INSTALLATION



COLORTEC INSTALLATION

IN

VR-1000B SYSTEMS

GENERAL

The installation of Colortec in VR-1000B systems requires the following:

1. The Processor must be catalog number 51450-07, -08 which in turn must be modified to the -12 version. The detailed procedure for this modification appears in the re-print of Field Engineering Bulletin F202-1 which is included in this manual at the end of the Installation section.
2. The Inter-Sync unit in the system must be equipped with the electronic resolver (rather than the mechanical resolver) . The earlier -01, -02, and -03 versions of Inter-Sync may be modified to the -04 version, or may be replaced by the current -05 version. Both of the latter contain the electronic resolver.

Procedure

Step 1:

Remove the blank panel at the bottom of Rack 2. Disconnect and remove the Power Panel, and the Inter-Sync Power Unit from Rack 2.

Step 2:

Mount the Colortec chassis in Rack 2 immediately below the Motor Power Amplifier chassis. It will be found necessary to remove the rear brackets on the Colortec chassis in order to place it in position.

NOTE

*If the Rack 2 power duct interferes with the Colortec chassis, it may be notched, or replaced with a smaller duct.*

Step 3:

While holding the Colortec side brackets level, mark and drill a 3/16-inch diameter mounting hole in both rear columns of rack 2. Fasten the Colortec chassis (in the level position) using two 8-32 machine screws, hexagon nuts, and lockwashers.

Step 4:

Transfer cable #376 from J1 (on the Processor chassis) , to J4s 3.58 REF. IN on the Colortec chassis. Extend the cable by means of a coaxial barrel and an extender cable (RG-59/U, or equivalent) .

Step 5:

Transfer cable #274 from J8 (on the AMTEC chassis) , to J10s H. REF. IN on the Colortec chassis. Partial removal of this cable from the harness will be necessary.

Step 6:

Transfer wire #388 from TB-A5 to TB-A8.

Step 7:

Disconnect and remove any cables that are connected between the connectors listed in the following table, and install new cables made with Belden #8281 or equivalent low-capacitance cable. In each instance use the shortest length of cable that will reach both connectors by the direct route.

From		To	
Modulator-Video	J3	Terminal Board	TB-E3
AMTEC Bypass Relay	J1	Demodulator-Video	J7
AMTEC Bypass Relay	J2	AMTEC	J2
AMTEC Bypass Relay	J3	AMTEC	J3
AMTEC Bypass Relay	J8	Colortec	J1
Colortec	J2	Processor	J11
Processor	J4	Terminal Board	TB-E4
Processor	J5	Terminal Board	TB-E5
Colortec	J3	Terminal Board	TB-J6

**Step 8:**

Install new coaxial cables (made with RG-59/U or equivalent) between the connectors listed in the following table. Disconnect any cables already attached to these connectors.

<i>From</i>		<i>To</i>	
Colortec	J5	Processor	J1
Colortec	J9	AMTEC chassis	J9
Colortec	J11	AMTEC Bypass Relay	J5
Colortec	J12	Processor	J8
AMTEC	J4	Guide Position Sensor	J2
Inter-Sync	J13	AMTEC Bypass Relay	J6
Inter-Sync	J16	AMTEC chassis	J8

**Step 9:**

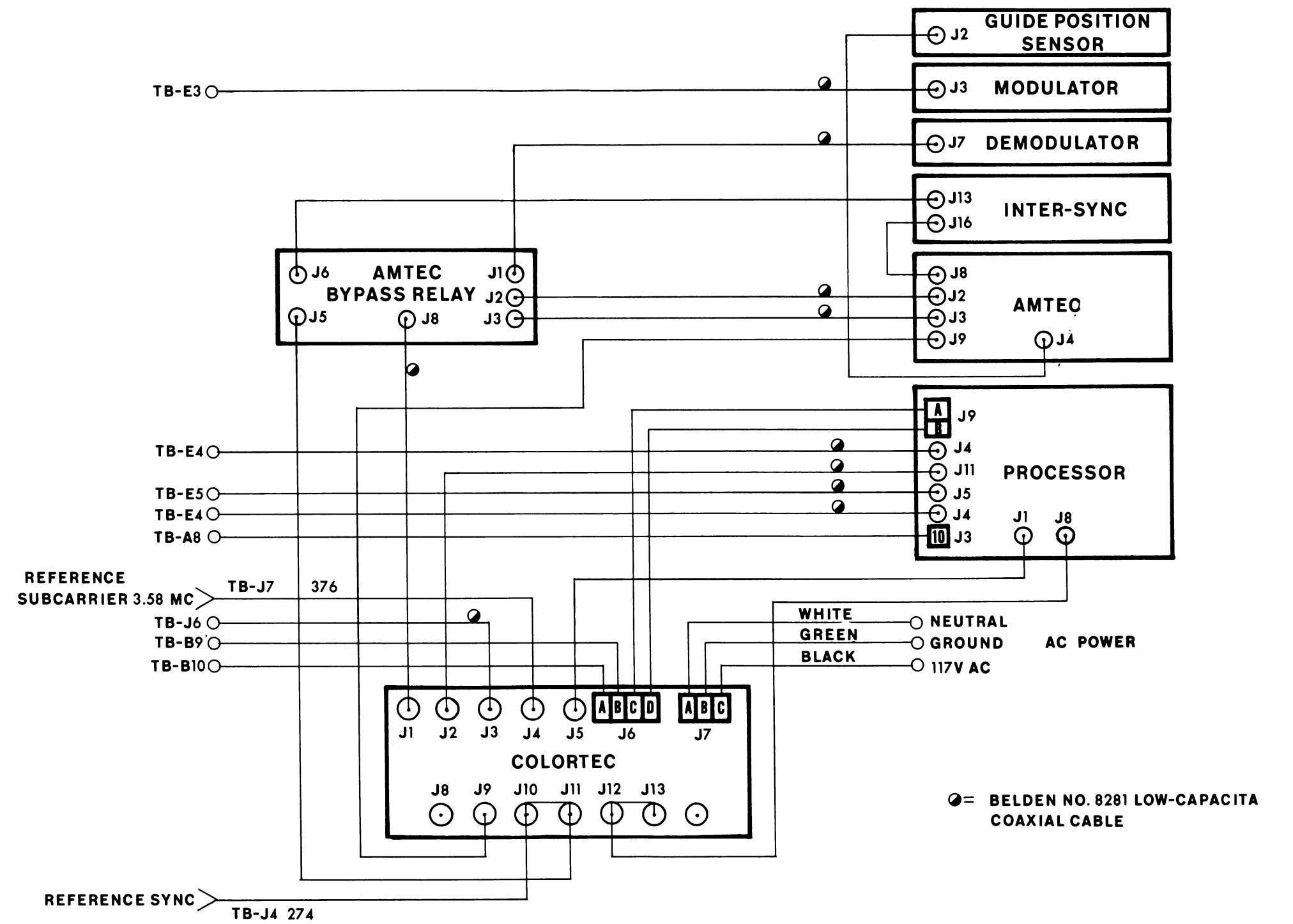
Install new relay control wires between the connection points listed in the following table.

<i>From</i>		<i>To</i>	
Colortec	J6-A	Colortec	TB-B10
Colortec	J6-B	Colortec	TB-B9
Colortec	J6-C	Processor	J9-A
Colortec	J6-D	Processor	J9-B

**Step 10:**

Attach a 3-conductor 18 B&S power cable to furnished Cannon connector J7p. Connect the neutral (black wire) to pin C, the ground (green wire) to pin B, and the 115 volts ac (white wire) to pin A. Insert cable connector J7p at J7s AC IN on the Colortec chassis; connect the opposite end of the cable to incoming ac power and system ground by the color code just given.





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AMPEX TECHNICAL SUPPORT  
FIELD ENGINEERING BULLETIN

G203-3  
1 of 2  
GEN'L  
3/62

51450-07 - 51450-08 PROCESSOR

I APPLICABILITY

All Videotape\* Equipments using 51450-07 or 51450-08 Processors.

II PURPOSE

To provide for installing two improved diodes in critical locations and improve dissipation margin in several locations.

III PARTS REQUIRED

<u>ITEM</u>	<u>QUANTITY</u>	<u>DESCRIPTION</u>
A.	1	FD100 Diode Part No. 013-988
B.	1	GO1 Diode Part No. 013-981
C.	1	100K 2W Resistor Part No. 041-224
D.	1	9K 5W Resistor Part No. 043-173
E.	1	20MF 350V Tubular Capacitor Part No. 031-048

IV PROCEDURE

1. Refer to Schematic 13382, page 1 to the right of V15A. In Voltage Divider Network, replace R-44 (22K2W) with Item "C" (100K 2W).
2. In V19A grid ckt, replace CR-25 (1N463) diode with Item "A" (FD-100). Observe polarity. USE CARE NOT TO OVERHEAT DIODES.

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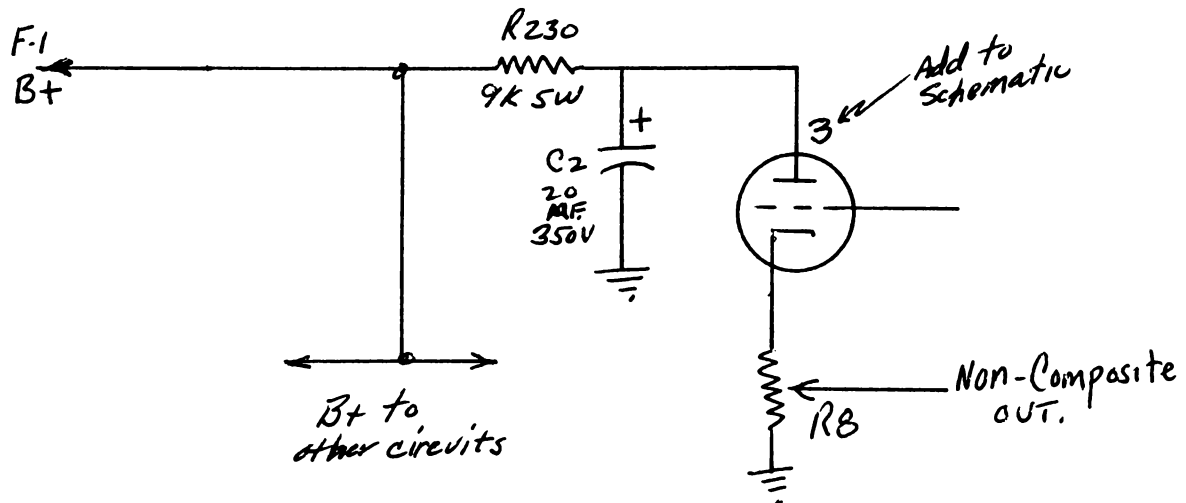
# AMPEX TECHNICAL SUPPORT

## FIELD ENGINEERING BULLETIN

Ref: G203-3  
Sheet Number: 2 of 2  
Model Number: GEN'L  
Date of issue: 3/62

### IV PROCEDURE cont'd

3. In V15B (page 2) cathode ckt, replace CR32 (1N463) with Item "B" (G-01) Diode. Observe polarity. USE CARE NOT TO OVERHEAT DIODES.
4. On Schematic (page 2). Refer to plate circuit of V32A (6BA8A). Add designation PIN 3 to plate of this tube on the schematic diagram. From PIN 3 install 9K 5W resistor (Item "D") to B plus and 20 MF 350V capacitor from PIN 3 to ground as per attached diagram.



5. Change all Schematics to incorporate the preceeding changes.

SERVICE ENGINEERING  
J. Reinke

\*Trademark Registered

## PROCESSOR MODIFICATION

(Required for use with Colortec)

### GENERAL

The installation of Colortec requires that Processor Catalog Number 51450-07, and -08 be modified to -12. Before these modifications are made, it is recommended that the Processor be first modified to Service Bulletin G203-3 dated 3/62, a copy of which appears in this Installation section.

If it is further desired to modify the non-composite output signal to include burst, this change, as outlined in Service Bulletin F202-1 dated 2/62, should also precede the modification to the -12 version which follows.

### NOTE

*In the performance of the first modification under G203-3, item E (a 20uf 350V capacitor) will not be required because C7b (already mounted on the chassis) will be available for this purpose in the Colortec modification.*

#### Step 1:

Remove all wiring and components except the filament wiring associated with V1 (6J6), V2 (6AU6), and V3 (6AU6). The components to be removed are as follows:

Resistors R123, 124, 126, 127, 131, 132, 133, 134, 135, 136, 137, 138, 141, 142, 143, 144, 145, 146, 147, 148, 151, 152, 153, 154, 155, 156, 157, 158, 161, 162.

Capacitors C61, 62, 63, 64, 65, 66, 67, 68, 71, 72, 73, 74, 75, 76, 77.

Inductance L1

Diodes CR9, 11, 12, 13, 14, 15.

### NOTE

*Do not disturb inductance L2, or resistors R1, and 128.*

#### Step 2:

Remove leads from:

C5a, b, c

C7a, b, and d

Pins 3 and 7 of the relay K2 socket

Pins A and B of J9p

J10s, and TP2

Pin 10 of J3p to F2

#### Step 3:

Run new wires from:

Pin 2 of J3p to pin 2 of relay K2 socket

Pin 10 of J3p to pin B of J9p

Pin A of J9p to pin 3 of relay K2 socket.

#### Step 4:

Replace original relay K2 (per drg. 30742-01) with the new relay per drg. 14746-01.

### CAUTION

*THE COIL OF THE NEW RELAY OPERATES FROM 28 VOLTS. BE SURE THAT THE HARNESS WIRING CHANGE TO PIN 10 OF J3s (REFER INSTALLATION DRAWINGS 54158 THROUGH 54161) HAS BEEN MADE PRIOR TO RE-CONNECTING THE PROCESSOR TO THE SYSTEM.*

#### Step 5:

Wire jumper from line side of fuse F1 to the line side of fuse F2.

*Step 6:*

Install C159 (300 pf mica capacitor) between junction of R269, CR46, and junction of C157, C158. This addition provides the needed delay of switching time to compensate for the signal time delay through Colortec.

*Step 7:*

Wire a single lead from the junction of R278, R281, R282, and C151 to test point TP2. Delete the original TP2 label (BURST KEY INPUT), and replace with the new decal that reads OSC. CONT.

**NOTE**

*The original TP2 label may be conveniently removed by a motor driven eraser (such as used by draftsmen). Following the application of the new label, spray it with clear lacquer.*

*Step 8:*

Replace diodes CR29, and CR31 with G-01 diodes. Replace diodes CR33, 34, 35, and 36 with FD-100 diodes.

*Step 9:*

Connect capacitor C45 (.1 uf ceramic) between the junction of R86 and R87, and ground.

*Step 10:*

Connect furnished coupling capacitor C46 (500 pf) to plate pin 5 of V2 (6AU6), and to grid pin 9 of V5 (6U8A).

*Step 11:*

Rewire the entire burst amplifier section from the input of J1s to the grid of V5b as shown on accompanying schematic 13382-11, -12, issue B. Keep the signal leads as short as possible. Locate the delay line terminating components (i.e. R131, 132, L11, L14) as close as possible to the delay line terminals. Locate L24 at the grid terminal (pin 1) of V3 (6AU6).

**NOTE**

*Inductors L1 and L2 should be tuned for maximum response of the burst signal.*

## AMPEX TECHNICAL SUPPORT

## FIELD ENGINEERING BULLETIN

Reference Number: F202-1

Sheet Number 1 of 5

Model Number COLOR

Date of Issue 2/62

## COLOR BURST ON NON-COMPOSITE OUTPUT

## I APPLICABILITY

A11 51450-07 and 51450-08 Processors

## II PURPOSE

To add Color Burst to non-composite Video output

## III PREREQUISITE

Changes outlined in Service Bulletin G202<sup>3</sup>-3 should be made previous to this.

## IV PARTS REQUIRED

<u>SCHEMATIC REFERENCE #</u>	<u>PREVIOUS DESCRIPTION</u>	<u>NEW DESCRIPTION</u>	<u>AMPEX PART #</u>
R83	1500 ohm, $\frac{1}{2}$ W, 10%	1000 ohm, $\frac{1}{2}$ W, 10%	041-048
R84	220 ohm, $\frac{1}{2}$ W, 10%	240 ohm, $\frac{1}{2}$ W, 10%	041-991
R85	47 kilohm, 1W, 10%	68 kilohm, 1W, 5%	041-255
R92	3000 ohm, 1W, 5%	220 ohm, $\frac{1}{2}$ W, 10%	041-040
C29	10 PF Mica	7 PF Mica	034-043
C30	7 PF Mica	5 PF Mica	034-946
C47	100 PF Mica	.01 Disc. Ceramic	030-002



# REPRINT

## AMPEX TECHNICAL SUPPORT

### FIELD ENGINEERING BULLETIN

Reference Number: F202-1  
 Sheet Number: 2 of 5  
 Model Number: COLOR  
 Date of Issue: 2/62

#### IV PARTS REQUIRED Cont'd

<u>SCHEMATIC REFERENCE #</u>	<u>PREVIOUS DESCRIPTION</u>	<u>NEW DESCRIPTION</u>	<u>AMPEX PART #</u>
L3	Var. Inductor 14-22 uH	Var. Inductor 8.5-14.5 uH	051-043
L4	Var. Inductor 22-29 uH	Var. Inductor 14-22 uH	051-015
L8	Var. Inductor 18-36 uH	Var. Inductor 14-22 uH	051-015
L10	Not used	Fixed Inductor 1.0 uH	541-990

#### SCHEMATIC DRAWING NUMBER CHANGE

##### BEFORE MODIFICATION

13382-07,-08, Issue J

##### AFTER MODIFICATION

54155-07,-08, Issue A

#### V PROCEDURE

1. Disconnect plate of V5b (Burst Adder) from plate of V6 (Video Amplifier) by removing jumper wire from PIN #1 of V5b to junction point of R77 and R91.
2. Remove wire which goes from junction R77, R91 to L8.
3. Disconnect C52 from L8 and rewire it directly to junction of R77, R91.
4. Disconnect C44 (1000 pF) from terminal strip where it joins R78.
5. Change L3 from 14-22 uH to 8.5-14 uH; rewire as before.
6. Change L4 from 22-29 uH to 14-22 uH; rewire as before.
7. Remove R92 and L8.

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### V PROCEDURE Cont'd

8. Replace L8, 18-36 uH (N. H. 120 Series), with 14-22 uH (N. H. 1000 Series).
9. Remove R83 (1500 ohms), R84 (220 ohms), R85 (47K), C47 (100 pF).
10. Remove C41 (100 pF) from PIN 7 of V5 and connect to vacant tie point adjacent to the center ground lug on terminal strip above and between V5 and V6.
11. Connect L10 (1.0 uH coil) to C41 (100 pF) and Pin 7 of V5.
12. Connect the bottom lug of L8 to the tie point with R78 with as short a lead as possible.
13. Connect R92 (220 ohms) directly between PIN 1 and PIN 6 of V5.
14. Install R83 (1000 ohms), R84 (240 ohms), R85 (68K 1W) and C47 (.01 uF disc ceramic). Use same tie point previously used for these components.
15. Connect the free end of C44 directly to the top lug on L8.
16. Change C29 from 10 pF to 7 pF
17. Change C30 from 7pF to 5 pF.

### Checkout

Using gated sweep video signal, set Processor up for normal operation and adjust video amplifier section for flat over-all frequency response as follows:

- A. With a dual trace scope, compare response at Video Output #1 or #2 with response at non-composite output. Be sure to terminate these signals at the scope. Adjust L4 for closest match in the region of 0 to 6 Mcs.
- B. With a high gain pre-amplifier, observe signal at TP8; adjust L9 and L12 for flat frequency response.

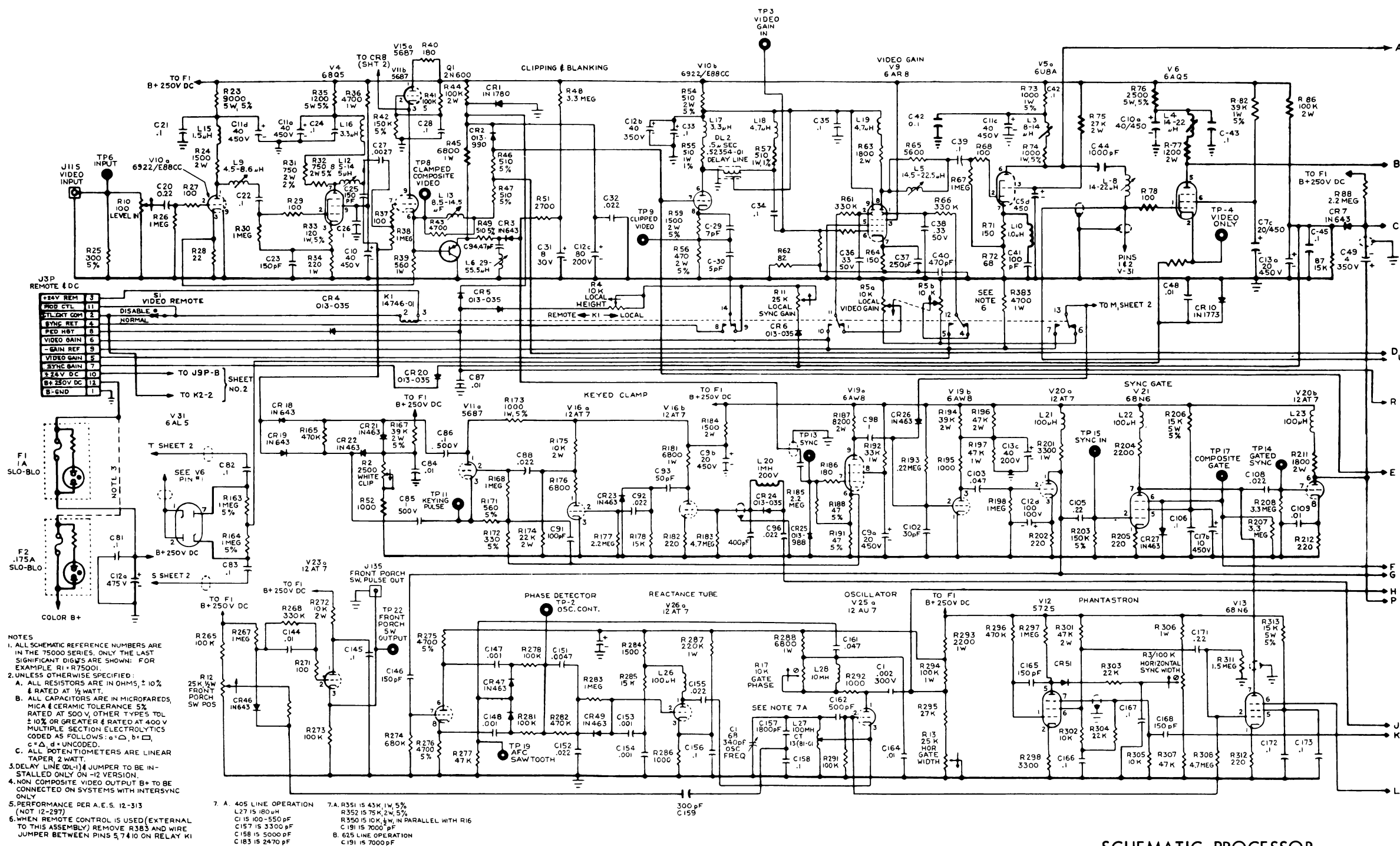
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V PROCEDURE Cont'd

- C. Observe signal at TP9; adjust L13 for flat frequency response.
- D. Observe output at TP7 with J4 s and J5 s locally terminated into 75 ohms; adjust L3, L5, and L8 for flat over-all frequency response.

SERVICE ENGINEERING  
J. Reinke



SCHEMATIC-PROCESSOR  
Drawing Number D-13382-11, -12-B  
Sheet 1 of 2



SYSTEM SET-UP PROCEDURE

GENERAL

The following procedure covers the system set-up adjustments for Colortec operation.

Step 1:

Thread a blank tape on the Tape Transport. Connect a 1 volt peak-to-peak color bar signal to J3s VIDEO INPUT on the Modulator-Video.

Step 2:

Adjust the Modulator-Video for color deviation. This involves setting the carrier sync tip frequency at 5.5 megacycles, and peak luminance at 6.5 megacycles.

NOTE

Please refer to one of the following references for the details of this procedure:

Manual Number	Equipment	Page Number
P59517	(AFC) Modulator Conv. Kit	24
P59518	(AFC) Modulator-Video	28-12
P59590	VR-1002 System Manual	28-20

Step 3:

Turn the Inter-Sync mode selector to the VERTICAL position; turn the Colortec and AMTEC mode selectors to the CONTROL OFF position.

Step 4:

Turn switch S4 on the -03, -04, or -05 Inter-Sync Framing Unit to the SPARE (or the COLORTEC) setting.

NOTE

The -02 Inter-Sync Framing Units require the modifications shown in red on page 71 of instruction manual P59505, which include switch S4 and related circuitry.

Step 5:

Turn the Record Driver gain controls as follows:  
R1 Fully Counterclockwise  
R2, R3, and R4 to mid-range.

Connect the microphone to J10s MIC INPUT. Note the Tape Timer reading and initiate RECORD mode. Make microphone announcements of the position of R1 while it is turned slowly through its range to the fully clockwise position. Then turn R1 to mid-range.

Step 6:

Repeat Step 5 for each of the other gain controls (R2, R3, and R4) in succession. Press the STOP pushbutton.

Step 7:

Reproduce the recording made in Steps 5 and 6 and determine the lowest setting of each gain control that will produce an rf playback level that is 90 percent of the maximum attained. Adjust R1, R2, R3, and R4 to the settings just determined.

Step 8:

Note the Tape Timer reading and initiate RECORD mode. Continue to record the color bar signal for five minutes. This recording will be used as a playback reference in the adjustments that follow.

Step 9:

Reproduce the recording made in Step 8. Place the switching transients at the beginning of the front porch by adjustment of R12 FRONT PORCH SW POS on the Processor.

Step 10:

Turn the Inter-Sync mode selector to the HORIZONTAL setting. Adjust the horizontal phase con-



trol on Inter-Sync to bring the reproduced video signal in phase with the reference.

*Step 11:*

Turn the AMTEC mode selector to the EXT. REF. setting. Adjust C004 EXT. REF. POS. (on AMTEC) until the pointer of meter M001 moves in the direction that C004 is turned. Then center the meter pointer at zero.

*Step 12:*

Turn the Colortec mode selector to the H. PHASED setting. Move the oscilloscope probe to TP005 (the video output) on Colortec. Trigger the oscilloscope at the vertical rate.

*Step 13:*

Adjust the Channel Switcher equalization controls (i.e. R2, R5, R8, and R12) for correct (and equal) levels of burst in all channels.

*Step 14:*

Connect the input of the color picture monitor directly to J003s OUT #2 (on Colortec). Adjust the

monitor controls for the best subjective presentation of color hue.

*Step 15:*

Transfer the monitor input to the system video output, and adjust the Processor burst phase control for the best subjective presentation of color hue.

### NOTE

*If a model 525 Vectorscope or equivalent is available, it should be used in place of the color monitor in Steps 14 and 15. The exact phase relationships will then be known, and the adjustment more precise.*

*Step 16:*

Critically observe the picture presentation for color banding. Eliminate color banding by trimming the adjustment of the Record Driver gain controls (i.e. R1, R2, R3, or R4) that are involved.

## OPERATING NOTES

### GENERAL

In order to realize the full performance capabilities of the Direct Color Process it is important that the operator understand the system factors that can affect the reproduced color video signal. The following discussion mentions the more important factors, and suggests the methods or precautions by which their effects may be minimized.

#### Channel Switcher

At the beginning of each playback, the settings of the Channel Switcher equalization controls (R2, R5, R8, and R12) should be adjusted to establish sync and burst heights that are equal among the four video channels.

By use of the oscilloscope to view the composite video signal at Video Output #2, and locking the instrument to the vertical reference, the negative burst cycle may be readily recognized and adjusted.

### CAUTION

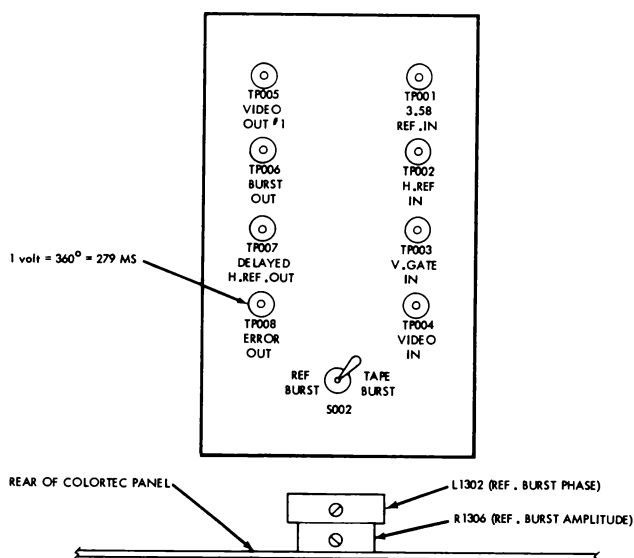
*THE SIGNAL AT VIDEO OUTPUT #2 IS ALSO AVAILABLE AT TP005 ON THE TEST POINT PANEL. TP005 IS PROVIDED AS A CONVENIENCE TO BE USED DURING TROUBLESHOOTING PERIODS ONLY.*

*BECAUSE NONE OF THE TEST POINTS ON THE TEST POINT PANEL ARE ISOLATED, THEY SHOULD NEVER BE USED DURING 'ON THE AIR' PERIODS.*

The equalizers should be adjusted to place the peak of the negative burst cycle at one-half the (negative) sync height, and establish equal heights among the channels.

### Reproduction of Non-Standard Color Recordings

It was mentioned earlier that the standard NTSC color signal specification requires that the horizontal scanning frequency be  $2/455$  of the burst frequency, and further that this relationship of sync-to-burst could not be maintained by color equipment that preceded Colortec. Thus it is that color dubs (meaning color recordings made from any reproduced color signal) made by color equipment that preceded Colortec are non-standard in this respect.



50123

Figure 19. TEST POINT PANEL

The reproduction of a non-standard color recording requires that Colortec be operated in the UNPHASED

mode, which means that while the instrument is locked to the reference subcarrier, sync may wander through excursions of  $\pm 20$  microseconds with respect to the subcarrier timing.

On the other hand a color dub of a recorded color signal reproduced by a Colortec-equipped system will result in a new recording in which the color signal is standard NTSC color in all respects. When such a recording is reproduced, Colortec may be operated in the PHASED mode, which means that the system is locked to the reference subcarrier and to reference sync.

### **Burst Phase and Amplitude**

Colortec provides two methods for the insertion of color burst. Two-position switch S002, located on the test point panel (at the rear of the front panel) permits selection of either method.

The method recommended for normal operation is the insertion of burst that is reproduced from the tape. This method involves filtering the recovered burst to remove some of the unwanted noise, and preserves the original burst information in terms of amplitude and phase.

The alternative method provides for the insertion of totally new burst that is derived from the reference subcarrier. The amplitude of this new burst is set by the adjustment of potentiometer R1306 (mounted on the rear of the front panel); the phase is set by the adjustment of variable inductor L1302 (similarly located). Both controls are accessible from above the Colortec chassis in the space between the (horizontal) test point panel and the rear of the front panel.

### **Velocity Component Errors**

The Colortec Direct Color Process makes correction of slowly accumulating time errors within each horizontal line, during the succeeding blanking interval.

This correction is adequate for accumulated mechanical servo, or for head quadrature errors. However,

large timing errors may be caused by incorrect positioning of the vacuum tape guide. If tip-to-tape engagement is incorrect, or if the vacuum tape guide is too high or too low, a velocity component error is injected which will cause a hue change within each line of the reproduced picture. For this reason the guide positional error must be held at the minimum.

### **Color Phase Control**

During operations involving switching between or among color video sources that are locked to the same frequency standard, the COLOR PHASE control (on the Colortec panel) provides the facility of a vernier adjustment of reproduced subcarrier phase to that of another signal source.

### **Sync Timing**

An improperly functioning sync generator may be the source of sync timing discontinuities during the vertical interval.

AMTEC may be used as a test instrument for the detection and measurement of sync timing discontinuities in the range of 20 to 100 cps. To perform the test, connect the suspect signal (adjusted to 1 volt peak-to-peak) to J002s VIDEO IN, turn the AMTEC function switch (S1) to NORMAL, and observe the error signal at TP006 ERROR. An error signal of 1 volt peak-to-peak equals 1 microsecond peak-to-peak.

A normal error signal will be less than 0.15 microsecond peak-to-peak. If it is found that reference sync contains an error greater than this, replace the reference sync signal normally connected to J10s H. REF IN (on Colortec) with horizontal drive (i.e. a continuous train of 5 microseconds pulses that occur at the horizontal rate).

The identical procedure may be followed to examine the sync timing of recorded composite video signals, or the composite video signal from any external source.

## THEORY OF OPERATION

### GENERAL

The reader will have noticed that the complete schematic reference number of individual circuit components of Colortec is given by a six-digit number. For example, the complete reference number of transistor Q1 on etched board 4 is written Q154401. This designation is far too lengthy for the frequent component references required by a theory discussion.

Accordingly, an abbreviated form of the reference numbers is used in the discussion that follows. In this form the component numbers will be identified in the familiar form shown on schematic 54145-01, followed by a hyphen and the number of the etched board on which the component is located. Thus Q154401 is abbreviated to read Q1-4.

### Theory and Signal Path

The video signal enters Colortec at J001s VIDEO IN, and is routed to three paths. The principal path is to video amplifier Q1-12 (to be discussed later). The second is to video amplifier Q11-11; the third is to separate video amplifier Q1-11. Both are on etched board #11.

By way of the third signal path the video signal frequency components below 2.5 megacycles are amplified by Q1-11 (a gain of approximately 10), and coupled by emitter follower Q2-11 to the sync separator Q4-11. The latter conducts on the positive peaks of sync in the composite video waveform. When Q4-11 conducts, capacitor C3-11 receives a negative charge which is partially removed by constant current source Q3-11. The discharge rate of C3-11 is such that Q4-11 continues to separate sync during any changing duty cycle that occurs in the input signal.

The output of Q4-11 is the desired sync waveform plus some undesired switching transients. This signal

is applied to emitter follower Q5-11. Diode CR2-11 normally conducts (i.e. it is ON); diode CR3-11 is normally-OFF. The conduction of CR2-11 causes capacitor C5-11 to charge positively. The presence of sync at the emitter of Q5-11 turns OFF CR2-11, and capacitor C5-11 then discharges through R18-11, until its voltage falls below the emitter potential of transient remover Q6-11, at which time the latter conducts. Pulses of less than 1.5 microseconds duration will not cause Q6-11 to conduct. Thus transients of less than 1.5 microseconds duration are eliminated.

The output waveform of Q6-11 is differentiated by C6-11 and R22-11. The trailing edge of the sync waveform causes normally-conducting pulse former Q7-11 to turn OFF. When Q7-11 ceases conduction, the circuit composed of L2-11 and C8-11 is caused to ring for approximately 2.4 microseconds.

### NOTE

*The duration of ringing may be altered by adjustment of inductor L2-11.*

The ringing pulse turns OFF normally-conducting pulse shaper Q8-11, which triggers normally-OFF pulse amplifier Q9-11. The output of Q9-11 drives the primary winding (terminals 1 and 2) of pulse transformer T1-11. The leading edge of the pulse lags the trailing edge of sync approximately 0.5 microsecond; the pulse duration is approximately 2.5 microseconds. The burst gate is operated by the output of the secondary winding (terminals 5 and 6) of transformer T1-11.

The second video input to etched board 11 is through the high pass filter (composed of C14, R32, and R33 on etched board 11), to the base of video amplifier Q11-11. The output of Q11-11 (a gain of approximately 10) is coupled by emitter follower Q12-11 to the burst gate. The latter opens during the burst

period that follows full-width sync pulses. Thus only the burst signal appears at the base of emitter follower Q13-11. This signal is routed to Q1-9 (on etched board 9), and Q6-10 (on etched board 10).

During the vertical and equalizing pulse intervals no burst appears in the composite video signal. In order that the burst gate be disabled during this interval, a vertical pulse is fed from the Processor to J012s, or J013s VERTICAL GATE IN. This pulse turns OFF normally-ON vertical gate Q10-11 which diverts the current that normally flows through Q10-11 through diode CR3-11, thus charging capacitor C5-11.

The burst from emitter follower Q13-11 is amplified by Q1-9 (on etched board 9) and routed through a bandpass filter (L1, C2, L2, L3, and C3 on etched board 9) to remove some of the unwanted noise components from the signal, and then amplified by Q2-9. Diodes CR1-9 and CR2-9 in the output circuit of Q2-9, limit the signal.

The resulting limited burst is coupled through emitter follower Q3-9 to amplifier Q4-9. The output of Q4-9 (approximately 8 volts peak-to-peak) is routed to crossover detector Q5-9, which normally-conducts.

### NOTE

*Limited burst is also taken from the emitter of Q4-9 and coupled by emitter follower Q10-9 to burst amplifier Q5-6 (to be discussed later).*

If the voltage at the collector of Q4-9 falls below the emitter potential of Q5-9, the latter will turn OFF, causing the inductance (i.e. the primary winding of transformer T1-9) to ring. Thus a ringing will take place at each negative crossover of the burst signal. This pulse (representative of the burst signal phase) is routed to divider AND gate Q9-9/Q6-9/Q1-8, and to amplifier Q9-8 (and ultimately, to the error detector on etched board 8).

The 3.58 mc reference signal enters the Colortec unit at J004s REF. IN, and passes through 0.4 micro-second (tapped) delay line DL002 to the base of emitter follower Q1-7 (on etched board 7).

### NOTE

*This 0.4 $\mu$ s delay of the 3.58 mc reference signal permits the recorder system output to be phased to another color video signal source.*

The output of Q1-7 is amplified by Q2-7, limited by CR1-7/CR2-7, and coupled by emitter follower Q3-7 to amplifier Q4-7, whose output is applied to crossover detector Q5-7. The action of reference crossover detector Q5-7 is identical with that of previously described burst crossover detector Q5-9. In this instance a ring is produced at each negative-going crossover of the 3.58 mc reference signal.

The output of the reference crossover detector is coupled by transformer T1-7 (winding 3,4) to reference AND gate Q6-7/Q14-7, and (by winding 5,6) to reference pulse amplifier Q10-7. The output of the latter is delayed 70 nanoseconds by delay line DL1-7, and coupled by emitter follower Q11-7 to binary divider Q12-7/Q13-7.

The binary divider is triggered at the 3.58 mc rate thus producing an output pulse at one-half this rate, or 1.79 mc. This output is applied (through C23-7 and R58-7) to the second input (i.e. the base of Q14-7) of reference AND gate Q6-7/Q14-7.

The reference AND gate will present an output pulse when a positive-going signal is simultaneously present at the bases of Q6-7 and Q14-7. The pulse output of the reference AND gate has a repetition period that is twice the period of the reference signal. The negative excursion of each output pulse turns ON reference waveforms generator Q7-7 (which is normally-OFF), and charges C10-7 through R26-7.

At the end of the pulse, C10-7 is discharged through resistors R27, 28, and 29-7. The resulting sawtooth waveform is routed through cascaded emitter followers Q8-7 and Q9-7. The output of the latter is feedback to the junction of R27-7 and R28-7.

### NOTE

*This "bootstrap" circuit improves the linearity of the sawtooth waveform.*

The amplitude of the sawtooth waveform is controlled by the setting of R29-7 SAW AMPLITUDE; its average dc level at test lug TL11-7 is controlled by the setting of R38-7 CENTERING.

The reference sawtooth output of previously mentioned emitter follower Q9-7 is also routed to center-tap terminal 4 (winding 3,5) of transformer T2-8 in the error detector circuit.

Divider AND gate Q9-9/Q6-9/Q1-8 receives two other signals in addition to the pulse representing burst phase that was mentioned earlier. The burst gate pulse from terminal 4 of T1-11 is applied to pulse

stretcher Q7-9, whose emitter output is fed to pulse former Q8-9. The formed (and delayed) positive burst gate pulse at the collector of Q8-9 is applied through diode CR7-9 to the base of Q9-9 of the divider AND gate; the tape burst pulse is coupled through terminal 3 of T1-9 and diode CR5-9 to the base of Q6-9, and as mentioned earlier, Q1-8 receives a signal from the reference binary Q12-7/Q13-7.

Thus the divider AND gate gives a pulse output (during the burst period only) whose normal repetition period is double that of the subcarrier period. However, if the reproduced burst is coincident with the triggering times of the binary, pulses at the subcarrier rate may occur.

### NOTE

*The divider AND gate presents an output signal only when a positive pulse occurs simultaneously at the base of each of its transistors.*

The divider AND gate output (including the extra pulses if any) is coupled by transformer T1-8 to one-shot multivibrator Q2-8/Q3-8 whose minimum repetition period is greater than 500 nanoseconds. The extra pulses are thus eliminated from the output of Q2-8/Q3-8. The resulting signal is applied to the base of Q4-8, which with Q5-8 functions as the signal AND gate.

Reproduced burst from crossover detector Q5-9 is also coupled through T1-9 to amplifier Q9-8, delayed 70 nanoseconds by DL1-8, and coupled by emitter follower Q10-8 to the base of Q5-8.

The output of the signal AND gate is a series of pulses whose repetition period is twice that of the reference during the burst interval. These signal pulses turn ON pulse amplifier Q6-8, whose output pulses are coupled by transformer T2-8 to the bases of error detector transistors Q7-8 and Q8-8, turning them ON. When both conduct, capacitor C12-8 is charged to a voltage that is representative of the instantaneous voltage of the sawtooth signal received at TL5-8 from the reference waveform generator.

The bias voltages established by the pulses across C10-8 and C11-8 prevent Q7-8 and Q8-8 from turning ON between pulse periods. The charge on C12-8 is proportional to the phase difference between the reference subcarrier and reproduced burst.

The error detector output is normally routed to the high impedance input of driver amplifier Q1-2,

whose output is coupled by emitter follower Q2-2 to amplifier Q4-2.

To compensate for the non-linear control characteristic of DL001, the output of Q4-2 is applied to a non-linear compensating network composed of R8-2, R9-2, R13-2 through R30-2, and CR1-2 through CR10-2. This network causes the error bias to vary approximately as the 4th power of the error detector output voltage.

At the output of the driver amplifier the error bias is in terms of a control voltage, the amplitude of which overcomes the non-linear characteristic of DL001. The polarity of this control voltage precisely coincides with that of the error detector output.

### NOTE

1. During *EE* and *RECORD* modes the control circuitry of the Television Recorder energizes relay K1-13 (on EB 13), which transfers the input of the driver amplifier from the error detector, to a fixed bias. Thus, during these modes the Colortec comparator is disconnected from DL001, which then operates as a fixed delay.
2. The emitter output of Q4-2 may be monitored at TL3-2, and drives meter M001 through R35-2. R56-2 is the calibrating potentiometer for meter M001.
3. The emitter output of Q4-2 is also coupled by emitter follower Q3-2 to J008s *ERROR MON. OUT*, and to panel test point TP008, where a 1 volt display equals 360 degrees phase shift.

The error (i.e. control) voltage from Q4-2 is fed to emitter follower Q5-2 which in turn feeds phase splitter Q6-2. The emitter output of Q6-2 is routed to the common bases of complementary emitter follower pair Q1-1/Q2-1; the collector output is routed to the common bases of complementary emitter follower pair Q3-1/Q4-1. The outputs of Q1-1/Q2-1, and of Q3-1/Q4-1 feed the control buses of voltage variable delay line DL001.

### NOTE

*DL001 is connected to the +A and -A outputs of etched board 1 through pins 5 and 4 respectively of connector J015s. The video IN and OUT signals from etched*

board 12 (the next discussion) are also connected to DL001 through J015s, by means of two coaxial sections of the connector.

Returning to the incoming composite video signal at J001s VIDEO IN, the principal signal path through cascaded amplifiers Q1-12 and Q2-12 (on etched board 12) is applied through emitter follower Q3-12 to the IN terminal of DL001. The network including L2, C5, R7, R8, C6, R9, and C7 (each on etched board 12) compensates the characteristic of the 2.5 micro-seconds fixed delay line which precedes the variable delay section of DL001.

### NOTE

*The 2.5 microseconds fixed delay permits the control circuit to derive an error signal prior to the insertion of video in the variable delay section, thus making it possible to correct the phase of the burst signal from which the error is derived.*

DL001 controls the delay of the tape signal to phase it with the reference. This control (or correction) is applied at the beginning of each horizontal line of video information. During the vertical and equalizing pulse intervals it remains unchanged at the level of the voltage applied to the preceding horizontal line.

The time-corrected signal from the OUT terminal of DL001 is successively amplified by Q4-12 and Q5-12, and routed to output emitter follower Q6-12.

### NOTE

*The network in the emitter circuit of Q4-12 compensates the frequency and phase characteristic of the variable section of DL001.*

The output of Q6-12 is routed through switch S001 (at all positions other than 6) to Q1-10.

### NOTE

*The position 6 setting of switch S001 inserts low pass filter FL001 in this signal path to remove the color subcarrier components, which converts the color video signal to monochrome. This switch setting is used only when a non-standard color signal departs beyond the time base correction capability of the system.*

Q1-10/Q2-10 comprise a differential amplifier whose output (taken from the collector of Q2-10) is coupled by emitter follower Q3-10 to the base of Q4-10. The latter, and Q5-10 form a totem pole output stage.

### NOTE

*A portion of the signal is feedback from the center of totem pole Q4-10/Q5-10 to the base of Q2-10.*

Two 75 ohm outputs (J002s OUT #1, and J003s OUT #2) are provided, as well as a higher impedance output that is routed to burst selector switch S002 (to be discussed later).

### NOTE

*One of the 75 ohm outputs is routed to the Processor; the other is available for monitoring the Colortec output signal.*

The portion of etched board 10 shown on sheet 3 of schematic 54145 detects the presence of burst in the tape signal and energizes relay K001 in both automatic selection modes. The input (which may be monitored at TP4-10) is the previously discussed stripped burst signal (approximately 2 volts peak-to-peak) from emitter follower Q13-11. This signal is coupled by emitter follower Q6-10 to amplifier Q7-10, whose output signal is rectified by diodes CR3-10 and CR4-10 and fed to emitter follower Q8-10.

The integrated output of Q8-10 drives Schmitt trigger Q9-10/Q10-10 whose output signal turns ON amplifier Q11-10 when burst is present in the video input signal. Q11-10 then energizes relay K001 if switch S001 is set at either of the automatic selection modes.

Etched board 3 (shown on sheet 4 of schematic 54145) delays the horizontal reference sync that is applied to Inter-Sync and AMTEC. The horizontal reference signal enters Colortec at J010s (or J011s) H. REF. IN and is amplified by Q1-3, differentiated by C2-3 and R4-3, amplified and shaped by Q2-3, and the leading edge used to trigger blocking oscillator Q3-3.

The pulse output of Q3-3 is routed to the primary winding of T1-3, and to emitter follower Q4-3. The output of Q4-3 is integrated by R14-3 and C6-3 and feedback to the junction of C4-3 and CR1-3 in the trigger circuit of blocking oscillator Q3-3.



## NOTE

*This feedback signal is used as a reference to prevent Q3-3 from firing at twice the line rate during the vertical interval. This permits the application of a composite sync signal (containing horizontal, and vertical sync) to the input.*

The blocking oscillator output is coupled to the base of amplifier Q6-3 through secondary winding 3-4 of transformer T1-3. Q6-3 is turned ON by this output signal, discharging capacitor C8-3 (during H. PHASED operation, or capacitors C8-3/C9-3 during UNPHASED operation). C8-3 is charged through constant current generator Q5-3, until its potential is sufficient to turn ON Q7-3. The turning ON of Q7-3 is controlled by the emitter potential of Q8-3, which in turn is related to the control signal that is applied to variable delay line DL001.

When Q7-3 turns ON, a pulse occurs in its collector output which triggers one-shot Q9-3/Q10-3/Q11-3. The output of the latter (a 2 microseconds pulse) is routed to the primary winding of transformer T2-3, and coupled by the secondary winding to the bases of complementary output transistors Q12-3 and Q13-3. The common-collector output of the latter is routed to J009s DELAYED H. REF. OUT, and may be monitored at TP1-3, or at panel test point TP007. The delayed horizontal reference signal at J009s is routed to the Inter-Sync and AMTEC units (as mentioned earlier).

The delay line control voltage (from EB 2) is routed successively through amplifiers Q14-3 and Q15-3 on etched board 3. The output of Q15-3 is integrated by R40-3, C19-3, and C10-4 in all modes other than NON-STD. COLOR. During the latter, C10-4 is removed from the integrating circuit by contacts of relay K2-4 when it is energized. K2-4 is energized when switch S001 is set at NON-STD COLOR. It is also energized by the automatic selection of the non-standard color detector when switch S001 is set at the (automatic) UNPHASED position.

The integrated output of Q15-3 is applied to the base of emitter follower Q8-3 (which controls the emitter potential of Q7-3 as mentioned above), and to the base of Q4-4 (on EB 4).

## NOTE

*By using the delay line control voltage to re-position the horizontal reference signal that is fed to the Inter-Sync and AMTEC*

*units, the Colortec comparator and delay line tend to operate in the middle of their ranges.*

Q4-4/Q6-4 function as a differential amplifier of the error signal. If the error signal level exceeds the voltage that will deviate the delayed horizontal reference one wavelength of the subcarrier (i.e. 279 nanoseconds) the one-shot multivibrator (Q7-4/Q8-4/Q9-4) will be triggered by the output of the differential amplifier through either CR3-4, or CR4-4. In positions 1, 2, and 6 of function switch S001 (i.e. the CTL. OFF, automatic H. PHASED, or L.P. FILTER settings), relay K1-3 will be energized, causing integrating capacitor C19-3 to be clamped (by way of K1-3 contacts) to the fixed potential of Zener diode CR5-4. This resets the delayed horizontal reference to the fixed delay position.

## NOTE

1. *This clamping (or "dumping") circuit is used only in the horizontally-phased modes of operation.*
2. *Q5-4 provides a high impedance to the signal at the junction of R17-4 and R18-4.*

Etched boards 5 and 11 (shown respectively on sheets 5 and 1 of schematic 54145) are identical. The second burst stripper (on etched board 5) provides burst feed to the Processor. Sync from the corrected video signal is used to gate either the burst from the corrected tape signal, or the reference 3.58 mc subcarrier. The gated signal is selected by switch S002 on the test point panel.

When switch S002 is set at the REF. BURST position, 3.58 mc subcarrier from the collector circuit of Q4-7 (in the reference waveform generator) is routed through a series resonant circuit (on EB 13) to the video input (Q11-5) of the second burst stripper.

The amplitude and phase of the burst, that is re-inserted in the Processor, are determined by the series resonant circuit on etched board 13. The latter is fastened to the rear of the Colortec panel, in the space between it and the horizontally mounted test point panel. While switch S002 is set at REF. BURST, potentiometer R6-13 controls the amplitude, and variable inductor L2-13 controls the phase.

The gated output from emitter follower Q13-5 is fed to etched board 4 (where it may be monitored at

TP1-4) and is routed through a bandpass filter (composed of C1-4, L1-4, L2-4, L3-4, and C3-4) that removes some of the unwanted noise from tape burst. The output of the bandpass filter is coupled by emitter follower Q1-4 to emitter follower Q3-4, whose output is routed through J5s BURST OUT to the Processor.

Burst switch Q2-4 is normally-OFF for color operation. During monochrome operation it provides a short-circuit to ground, disabling the burst feed to the Processor. Q2-4 is controlled by the voltage applied to the swinger of function switch S001B.

The non-standard color detector (located on etched board #6) is shown on sheet 6 of schematic 54145, and is also described by the accompanying block diagram. The burst gating pulse (from etched board 11) enters etched board 6 at TP1-6 and is coupled through capacitor C1-6 to pulse stretcher Q1-6.

#### NOTE

*This burst gate pulse is derived from tape sync as noted previously; its width is increased by the action of Q1-6 and associated circuitry.*

The output of Q1-6 cuts OFF the normal conduction of switch Q2-6, thus allowing oscillator Q3-6 to oscillate at its normal 7.16 mc frequency. During the absence of pulses from Q1-6, switch Q2-6 resumes conduction, which shorts the oscillator output to ground.

#### NOTE

*It should be noted that the frequency generated by Q3-6 is exactly double that of the 3.58 mc subcarrier.*

The 7.16 mc output signal of Q3-6 (taken from the tap of variable inductor L1-6) is coupled by emitter follower Q4-6 to the comparator bridge (composed of diodes CR2, 3, 4, and 5-6, C9-6, R15-6, and the secondary winding of T1-6).

The second input of the non-standard color detector is the limited burst (from Q10-9) which enters etched board 6 at the junction of TP2-6 and C11-6, and is fed to burst amplifier Q5-6.

The negative peaks of the burst signal at terminal 4 of T1-6 cause the comparator bridge to open (i.e. to conduct) charging C10-6. Thus the burst signal samples the 7.16 mc oscillator signal which is phase-controlled by the tape sync signal.

The voltage output of the comparator is related to the phase difference between tape burst and tape sync. This signal is coupled by emitter follower Q6-6 to amplifier Q7-6, then through a low pass filter (composed of L2-6, C16-6, C17-6, and C18-6) to ac amplifier Q8-6.

#### NOTE

*The absence of burst during the vertical interval allows a 60 cps component to appear during that time. The low pass filter eliminates this unwanted signal component.*

The only time that a significant output voltage will appear at Q8-6 is during the presence of a non-standard color signal. This voltage is rectified by voltage doubler CR7-6/CR6-6 and coupled by emitter follower Q9-6 to the base of Q10-6, which with Q11-6 functions as a Schmitt trigger. The output of the latter (taken from the collector of Q11-6) is routed to position 3 (the automatic UNPHASED setting) of function switch S001-C. While S001 is at this setting and a non-standard color signal is present, relays K2-4 and K1-4 are energized by the Schmitt trigger output.

#### Colortec Power Supply

In order to assure the accuracy and stability of performance designed into Colortec circuitry, the integral power supply has been designed to provide a high degree of voltage regulation, and the minimum of drift and ripple. The supply output voltages are +12.0 volts, and -12.0 volts dc with respect to ground.

The output from the secondary winding of transformer T001 is rectified by a diode bridge (CR001 through CR004) whose unregulated output is 36 volts dc. This output is routed through a series current regulator and two shunt voltage regulators (connected in series) each of which develop 12 volts dc. The mid-point between the shunt regulators is connected to circuit ground.

Power transistor Q001 regulates the load current flowing from the bridge rectifier.

#### NOTE

*Current regulation also smooths out the ripple in the rectifier output, and eliminates the need for a filter choke.*

Each of the identical shunt regulators employs a power transistor (acting as a shunt element) that is controlled by a two-stage temperature compensated dc amplifier. The latter uses a low temperature coefficient reference diode as a comparison source.

Trimming resistors R18-1 and R21-1 provide precise control of the positive and negative regulator outputs, and are set to +12.0 and to -12.0 volts respectively.

Each shunt regulator includes a large energy storage capacitor (C002 and C003 respectively) connected across its output to supply peak load currents.

## COLORTEC ALIGNMENT PROCEDURE

### GENERAL

The Colortec Alignment Procedure restores the adjustments of Colortec that become invalid when a defective etched board or other component is repaired or replaced. It is not intended to compensate for circuit malfunctions, or for the initial setup at the time of installation.

#### Initial Conditions

1. Turn-ON System power, and allow 20 minutes for warm-up.
2. Determine that all Colortec etched boards are firmly seated in their respective receptacles.
3. Determine that Colortec is properly installed in the system and that the necessary input signals, adjusted to their correct levels, are connected.
4. Disconnect J6p from J6s RLY. CTL. IN.

#### Required Equipment

- 1—Precision type voltmeter, calibrated to known accuracy.
- 1—Tektronix 540 series Oscilloscope, with types CA, and 53/54L preamplifiers, or equivalent.
- 2—Standard 14pf oscilloscope probes.
- 2—Low Capacitance (2.5pf) oscilloscope probes.
- 1—Sine/Square Generator, 100 to 10000 cps, adjustable level.
- 1—Signal Generator, adjustable to 3.4 mc at .3 volt peak-to-peak.
- 1—Video Sweep Generator, 0 to 6 mc, adjustable level.
- 1—Vectorscope.

### PROCEDURE

#### Power Supply

##### Step 1:

Connect the voltmeter successively between chassis ground and test points TP3-1 and TP4-1. Adjust R18-1 and R21-1 respectively, until the positive, and negative voltages are exactly 12.0 volts (dc).

##### Step 2:

Connect the voltmeter between TP3-1 and TL3-1, and determine that the unregulated voltage is 36 ( $\pm 1$ ) volts.

#### Driver Amplifier (EB2), Isolation Amplifier (EB1)

##### Step 3:

Turn function selector S001 to the CONTROL OFF setting. Connect the voltmeter successively between ground and TP1-1, and TP2-1. Adjust R48-2 until the successive voltages are centered above and below 1.35 volts dc. Adjust R56-2 to center the Colortec panel meter at zero.

##### Step 4:

Connect the square wave generator output through a 4 $\mu$ f capacitor to TP1-2 and to circuit ground. Install the type CA preamplifier in the oscilloscope, and attach both 14pf probes to TP1-1 (on etched board #1). Set the generator at 5000 cps and adjust its output level until the signal displayed is 1.5 volts peak-to-peak.

##### Step 5:

Synchronize the oscilloscope externally to the square wave signal. Carefully match the preamplifier gain and probe equalization adjustments while in a differential mode, until the generator output signal can be completely cancelled.

**Step 6:**

Move one of the 14pf probes to TP2-1. Determine that a difference component between the two signals appears as a spike that occurs at the transition time of the square wave signal. Adjust R11-1/L3-1, and R4-1/L1-1 to minimize these (positive and negative) spikes.

**NOTE**

*R11-1/L3-1 control the spike amplitude in one direction of the square wave transition; R4-1/L1-1 control the amplitude in the opposite direction. It is normal to find that one or both inductances may require adjustment to one limit or the other of their range.*

**Step 7:**

Turn the function selector to the STD. COLOR setting. Trigger the oscilloscope from TP003. Observe the waveform at TP1-1. Adjust the COLOR PHASE control to center the pointer of panel meter M001. Adjust R1-2 to eliminate tilt during the vertical interval.

**Video Path (EB12, 10, and DL001)**

**Step 8:**

Connect the sweep generator output to J001 VIDEO IN, and adjust the signal level to 0.25 volt peak-to-peak. Adjust C4-10 for optimum flat response from 0 to 6 megacycles at J002s OUT #1 (or J003s OUT #2) while both outputs are terminated by 75 ohms. Disconnect the sweep generator.

**Step 9:**

Connect the 1 volt peak-to-peak composite color video signal to J001 VIDEO IN. Determine that the output at J002s OUT #1 is 1 volt peak-to-peak. Leave the composite video signal connected.

**NOTE**

*If variable delay line DL001 is replaced, it will be necessary to re-adjust burst phase as described in the System Set-Up Procedure.*

**First Burst Stripper (EB 11)**

**Step 10:**

Determine that the video input signal at TL1-11 is 1 volt peak-to-peak.

**Step 11:**

Move the probe to TL6-11, and adjust L2-11 for a pulse duration of 2.7 microseconds.

**Step 12:**

Remove the lead from pin C of the EB 11 connector, and ground pin C.

**Step 13:**

Move the probe to TL9-11, and adjust R39-11 for the best horizontal balance during the period that the gate is open. Restore the original connection to Pin C of the EB 11 connector.

**Second Burst Stripper (EB 5)**

**Step 14:**

Determine that the video input signal at TL1-5 is 1 volt peak-to-peak.

**Step 15:**

Move the probe to TL6-5, and adjust L2-5 for a pulse duration of 2.5 microseconds.

**Step 16:**

Remove the lead from pin C of the EB 5 connector, and ground pin C.

**Step 17:**

Move the probe to TL9-5, and adjust R39-5 for the best horizontal balance during the period that the gate is open. Restore the original connection to pin C of the EB 5 connector.

**Signal Waveform Generator (EB 9)**

**Step 18:**

Remove the lead from pin C of EB 11. Connect the signal generator output to pin C, set the generator at 3.4 megacycles, and adjust the level to display 0.286 volt peak-to-peak at pin C.

**Step 19:**

Move the probe to TL1-9, and adjust L1-9 and L2-9 for maximum amplitude (i.e. 1 to 1.5 volts peak-to-peak). Remove the probe.

**Step 20:**

Place the 2.5pf probe at TL3-9, and adjust L4-9 for a maximum signal amplitude of approximately 8 volts peak-to-peak. Leave the probe at TL3-9.

**Step 21:**

Disconnect the signal generator and restore the original connection to pin C of EB 11. Determine

that the maximum signal amplitude remains approximately 8 volts peak-to-peak. Remove the probe.

**Step 22:**

Trigger the oscilloscope from TP002. Place the 14pf probe at TL4-8. Adjust L5-9 for a display of 16 pulses. Remove the probe. Disconnect the trigger.

**NOTE**

*To adjust L5-9, tune for a display of 17 pulses, then back-off the adjustment until the 17th pulse disappears.*

**Reference Waveform Generator (EB 7)**

**Step 23:**

Place the 2.5 pf probe at TL3-7, and adjust L2-7 for a maximum amplitude of approximately 8 volts peak-to-peak. Remove the probe.

**Horizontal Reference Delay (EB 3)**

**Step 24:**

Connect the voltmeter between pin P (of the EB 3 connector) and ground, and determine that approximately -6 volts is present.

**Step 25:**

Connect the voltmeter to pin P and to TL8-3. Set function selector S001 at CONTROL OFF, and adjust R44-3 for a zero meter reading.

**Dumping Adjustment (EB 4)**

**Step 26:**

Turn function selector S001 to the L. P. FILTER setting. Trigger the oscilloscope from TP002. The panel meter (M001) should read zero.

**Step 27:**

Place the 14pf probe at TP007, and adjust R48-2 to delay the pulse 279 nanoseconds. Note the amount and direction by which the panel meter reading changes.

**Step 28:**

Adjust R14-4 until the pulse just begins to oscillate between zero and the delayed position.

**Step 29:**

Re-adjust R48-2 to advance the pulse 279 nanoseconds from zero.

**Step 30:**

Adjust R16-4 until the pulse just begins to oscillate between zero and the advanced position.

**Step 31:**

Re-adjust R48-2 until the panel meter reads zero. Remove the probe from TP007.

**Burst Sensor (EB 10)**

**Step 32:**

Place the 2.5pf probe at TL3-10, and adjust L2-10 for a maximum burst amplitude of approximately 10 volts peak-to-peak. Remove the probe.

**Non-Standard Color Detector (EB 6)**

**Step 33:**

Determine that the oscilloscope is triggered from TP002. Place the 14pf probe at TP1-6. Turn function selector S001 to the H. PHASED setting. Determine that a 4 volts amplitude negative pulse is displayed.

**Step 34:**

Move the probe to TP2-6. Determine that the limited burst displayed is approximately 1.1 volts peak-to-peak. Remove the probe.

**Step 35:**

Place the 2.5pf probe at TL5-6. Adjust C14-6 for a maximum burst amplitude of approximately 26 volts peak-to-peak. Leave the probe at TL5-6.

**Step 36:**

Install the type CA preamplifier in the oscilloscope. Place the second 2.5pf probe at TL3-6. Observe both waveforms and adjust L1-6 until the frequency of the waveform displayed is *exactly* twice that of the TL5-6 display.

**Step 37:**

Trigger the oscilloscope from TP003. Move the probe to TL6-6. Adjust R22-6 to eliminate tilt during the vertical interval.

**NOTE**

*If no waveform is displayed at TL6-6, reproduce a non-standard color recording during the adjustment of R22-6.*

**Gain and Centering Adjustments**

If the Reference Waveform Generator (EB 7), or the Error Detector (EB 8) are replaced, the Colortec gain and centering controls will require re-adjustment.

**Step 38:**

Turn function selector S001 to the STD. COLOR setting; turn the AMTEC function selector to the EXT. CONTROL setting. Connect a 1000 cps sine wave signal to J007s EXT. CTL. IN (on AMTEC). Disconnect J7p from the AMTEC relay control box.

**Step 39:**

Install the type CA preamplifier in the oscilloscope. Connect the signal at AMTEC J006s ERROR MON. OUT, and the signal at Colortec J008s ERROR MON. OUT to the type CA preamplifier by means of direct coaxial cables.

**Step 40:**

Slowly increase the sine wave signal level until the error signal waveform from Colortec begins to distort. This point marks the end of the variable signal delay range. Adjust the COLOR PHASE control to center voltage variable delay line DL001.

**NOTE**

*The above adjustment will have been achieved when a slight increase in the sine wave signal level causes distortion of the positive and negative peaks of the error signal waveform.*

**Step 41:**

Determine the amplitude of the AMTEC error signal. Replace the 1000 cps sine wave signal at J007s (connected in Step 38) with a 1000 cps square wave signal adjusted to produce a level at AMTEC J006s that is one-half that observed with the sine wave signal.

**Step 42:**

Connect the Vectorscope to J002s OUT #1 (or J003s OUT #2), and adjust gain control R29-7 for a minimum spread of the burst vector displayed.

**Step 43:**

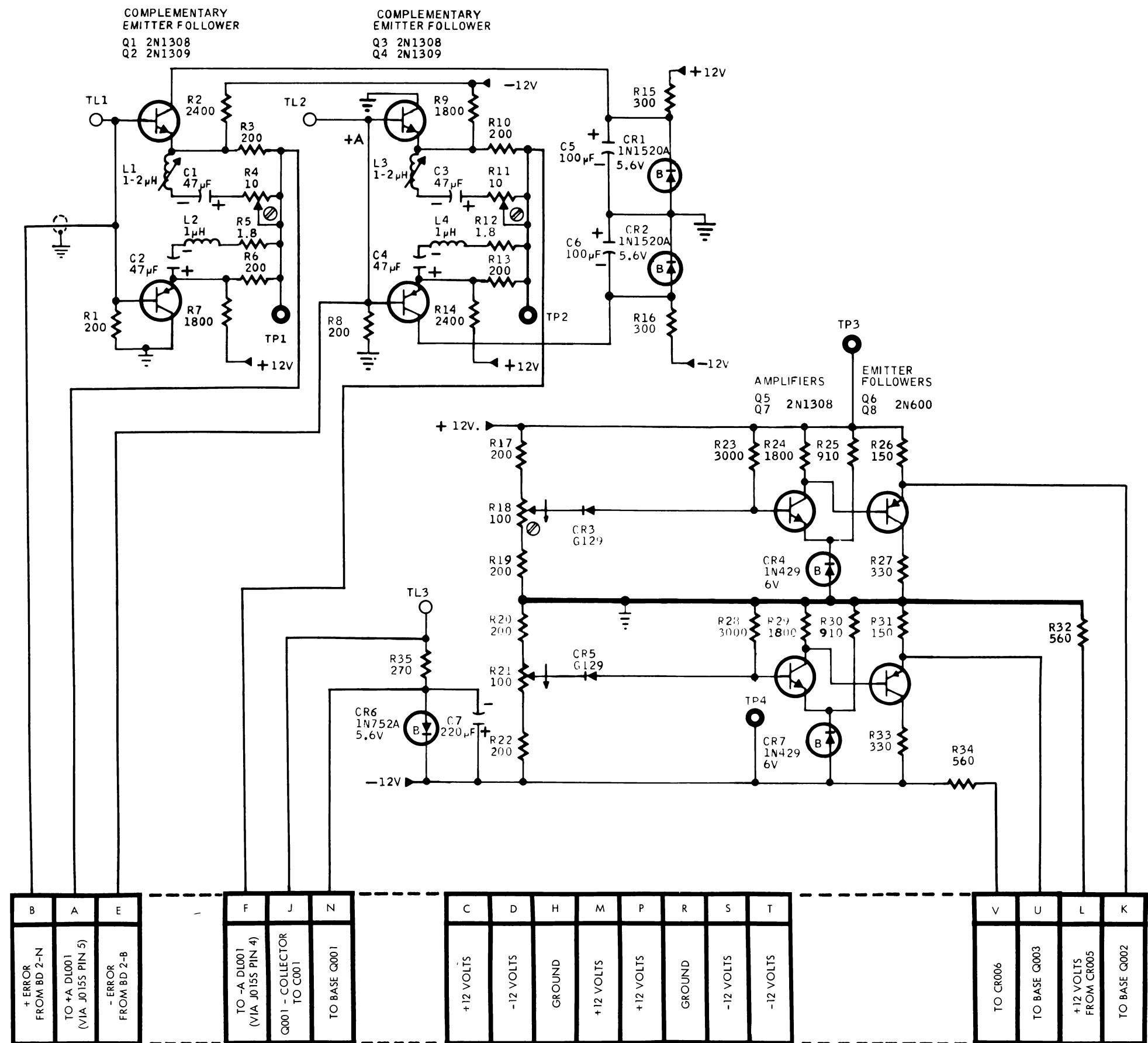
Adjust centering control R38-7 for equal positive and negative deflections of panel meter M001 as the COLOR PHASE control is adjusted throughout its range.

**Step 44:**

Repeat Steps 42 and 43.

**Step 45:**

Disconnect the square wave generator, re-connect J7p to the AMTEC Relay Control Box, and re-connect J6p to J6s RLY. CTL. IN on Colortec.



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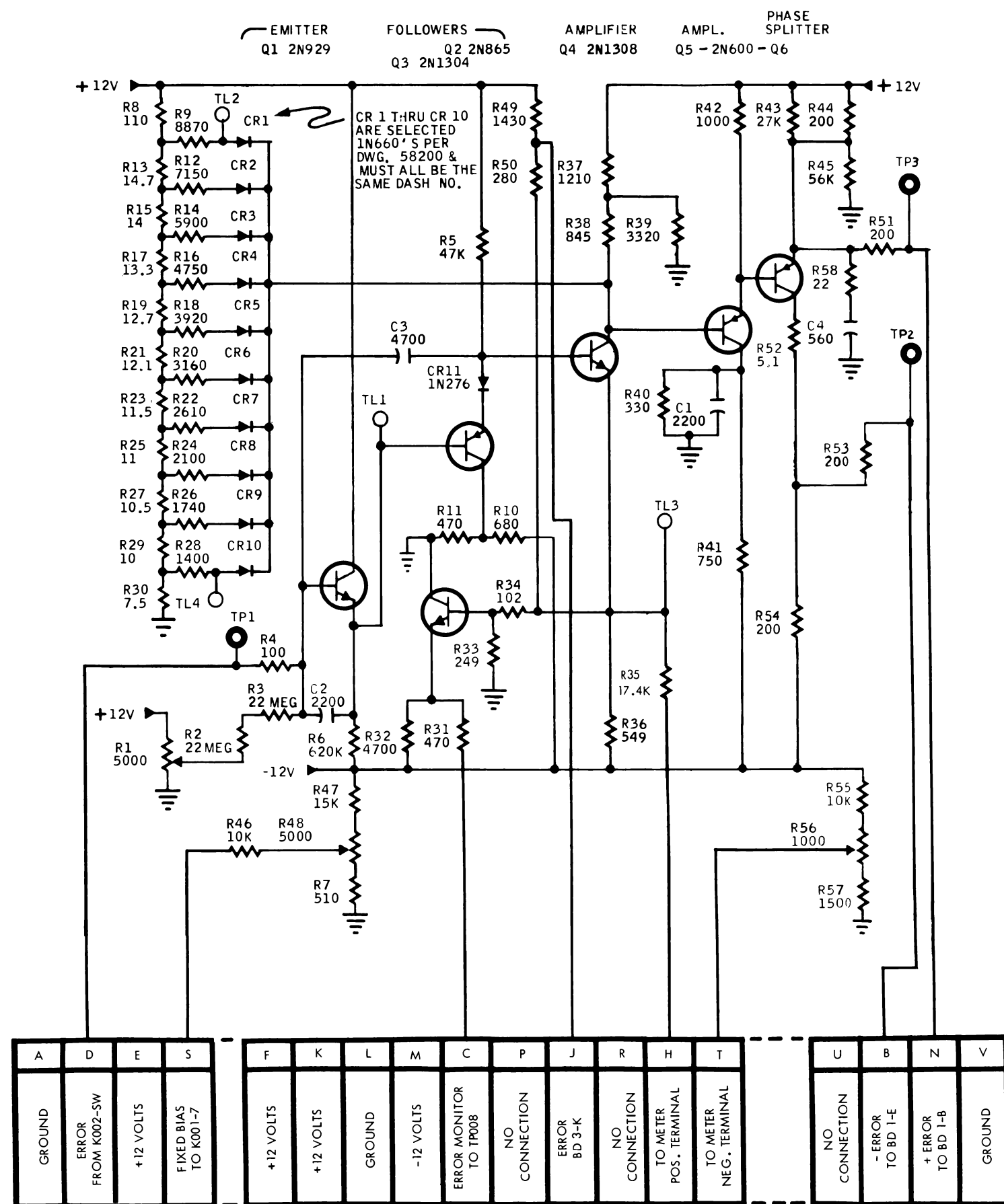
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COLORTEC ETCHED BOARD #1  
Catalog Number 52964-01



<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
L1, 3	Peaking Coil, Variable	D-51979-17
	Etched Board, Spec Dwg, (1-2 $\mu$ H)	C-52528-01
	Handle, Snap-On Circuit Board	C-52963-01
	Etched Board Subassembly	B-58203-01
Q8	Transistor, Req. Dwg., 2N600	B-58203-02
Q6	Transistor, Req., 2N600	B-55379-01
	Label-Identification: Colortec E.B.I.	013-069
CR4, 7	Diode, 1N429, 6v	013-133
CR1, 2	Diode, Zener, 1N1520A, 5.6v	013-983
CR6	Diode, Zener, 1N752A, 5.6v	013-984
CR3, 5	Diode, G129	014-070
For Q1, 4	Heat Sink, Red, .318 I.D. x 1/4	014-094
For Q6, 8	Heat Sink, Black, .294 I.D. x 1/4	014-986
Q2, 4	Transistor, 2N1309	014-987
Q1, 3, 5, 7	Transistor, 2N1308	018-019
	Adhesive, Eastman #910	
C7	Capacitor, Tant, 220 mfd, Polarized	037-993
	10v, 20%	
C1, 2, 3, 4	Capacitor, Tant, 47 mfd, Polarized	037-997
	6v, 20%	
C5, 6	Capacitor, Tant, 100 mfd, Polarized	037-998
	10v, 20%	
R24, 29, 7, 9	Resistor, Fixed, Comp, 1.8k, 1/2w, 5%	041-009
R35	Resistor, Fixed, Comp, 270 ohms,	041-099
	1w, 5%	
R26, 31	Resistor, Fixed, Comp, 150 ohms,	041-282
	1/2w, 5%	
R2, 14	Resistor, Fixed, Comp, 2400, 1/2w, 5%	041-316
R23, 28	Resistor, Fixed, Comp, 3k, 1/2w, 5%	041-475
R27, 33	Resistor, Fixed, Comp, 330 ohms,	041-501
	1w, 5%	
R25, 30	Resistor, Fixed, Comp, 910 ohms,	041-522
	1/2w, 5%	
R15, 16	Resistor, Fixed, Comp, 300 ohms,	041-983
	1w, 5%	
R32, 34	Resistor, Fixed, Comp, 560 ohms,	041-999
	1w, 5%	
R6, 3, 10, 13	Resistor, Fixed, DF, 200 ohms, 1/2w, 5%	042-167
R17, 19, 20, 22	Resistor, Fixed, DF, 200 ohms, 1w, 1%	042-204
R5, 12	Resistor, Fixed, WW, 1.8 ohms,	043-979
	1/2w, 5%	
R1, 8	Resistor, Fixed, WW, 200 ohms,	043-981
	1/2w, .25%	
R18, 21	Resistor, Variable, 100 ohms,	044-976
	1/4w, $\pm 10\%$	
R4, 11	Resistor, Variable, 10 ohms,	044-978
	1/4w, $\pm 10\%$	
For Q1, 4, 6, 8	Grease, Silicone, D-C #4	087-063
	Connector, Plug, Male, 18 Pin	145-991
TP3	Test Point, Red	148-027
TP4	Test Point, Blue	148-030
TP1, 2	Test Point, White	148-028
For Q1 thru Q8	Spacer, Transistor Pad	280-998
	Rivet, .125 Dia. x .500 LG	460-068
	Washer, Fibre, 1/8 ID, 1/4 OD x 1/32	503-010
L2, 4	Choke, 1 $\mu$ H, 5%	541-973
	Tubing, Teflon, #20	600-036
	Wire, Bare, Solid #22	615-002

ETCHED BOARD NO. 1  
Assembly  
ISOLATION AMPLIFIER, POWER SUPPLY, COLORTEC

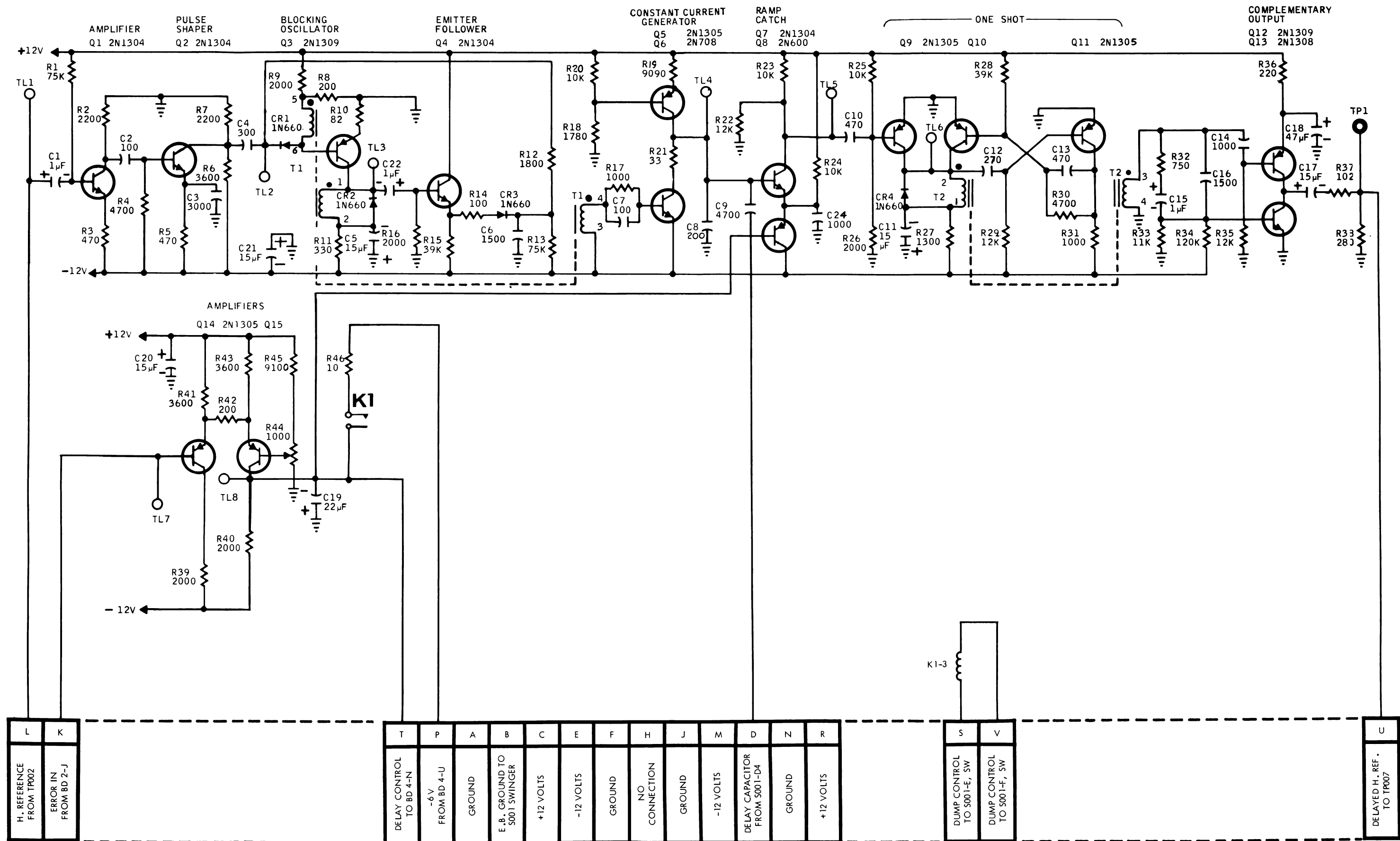


<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
Ref. Q6	Handle, Snap On Circuit Board	C-52528-01
	Heat Sink, Large, Subassembly	B52532-01
	Etched Board Subassembly	C-52969-02
CR1 thru 10	Diode Spec. Dwg. (Selected 1N660, all diodes must be same dash number)	8-58200-01 thru -09
Q5, 6	Transistor, Req. Dwg. (2N600)	B-58203-01
	Identification, Label, Colortec E.B. 2	B-55379-01
CR11	Diode, 1N276	013-986
Ref. Q4	Heat Sink, Red	014-070
Ref. Q5	Heat Sink, Black	014-094
Q3	Transistor, 2N1304	014-105
Q1	Transistor, 2N929	014-192
Q2	Transistor, 2N865	014-202
Q4	Transistor, 2N1308	014-987
	Cement, Eastman #910	018-019
C4	Capacitor, Silver Mica, 560pf, 500v, 5%	034-929
C1, 2	Capacitor, Mica, 2200pf, 500v, 5%	034-958
C3	Capacitor, Mica, 4700pf, 300v, 5%	034-959
R4	Resistor, Fixed, Comp, 100 ohms, 1/2w, 5%	041-003
R57	Resistor, Fixed, Comp, 1500 ohms, 1/2w, 5%	041-008
R32	Resistor, Fixed, Comp, 4700 ohms, 1/2w, 5%	041-013
R46, 55	Resistor, Fixed, Comp, 10k, 1/2w, 5%	041-014
R43	Resistor, Fixed, Comp, 27k, 1/2w, 5%	041-015
R5	Resistor, Fixed, Comp, 47k, 1/2w, 5%	041-020
R47	Resistor, Fixed, Comp, 15k, 1/2w, 5%	041-254
R40	Resistor, Fixed, Comp, 330 ohms, 1/2w, 5%	041-329
R11, 31	Resistor, Fixed, Comp, 470 ohms, 1/2w, 5%	041 336
R10	Resistor, Fixed, Comp, 680 ohms, 1/2w, 5%	041-343
R7	Resistor, Fixed, Comp, 510 ohms, 1/2w, 5%	041-404
R58	Resistor, Fixed, Comp, 22 ohms, 1/2w, 5%	041-421
R45	Resistor, Fixed, Comp, 56k, 1/2w, 5%	041-460
R2, 3	Resistor, Fixed, Comp, 22 meg, 1/2w, 5%	041-589
R6	Resistor, Fixed, Comp, 620k, 1/2w, 5%	041-900
R15	Resistor, Fixed, DF, 14 ohms, 1/2w, 1%	042-071
R29	Resistor, Fixed, DF, 10 ohms, 1/2w, 1%	042-073
R37	Resistor, Fixed, DF, 1210 ohms, 1/2w, 1%	042-126
R25	Resistor, Fixed, DF, 11 ohms, 1/2w, 1%	042-171
R39	Resistor, Fixed, DF, 3320 ohms, 1/2w, 1%	042-217
R33	Resistor, Fixed, DF, 249 ohms, 1/2w, 1%	042-246
R49	Resistor, Fixed, DF, 1430 ohms, 1/2w, 1%	042-321
R38	Resistor, Fixed, DF, 845 ohms, 1/2w, 1%	042-928
R50	Resistor, Fixed, DF, 280 ohms, 1/2w, 1%	042-937
R34	Resistor, Fixed, DF, 102 ohms, 1/2w, 1%	042-938
R28	Resistor, Fixed, DF, 1400 ohms, 1/2w, 1%	042-952
R26	Resistor, Fixed, DF, 1740 ohms, 1/2w, 1%	042-593
R24	Resistor, Fixed, DF, 2100 ohms, 1/2w, 1%	042-954
R22	Resistor, Fixed, DF, 2610 ohms, 1/2w, 1%	042-955
R20	Resistor, Fixed, DF, 3160 ohms, 1/2w, 1%	042-956
R18	Resistor, Fixed, DF, 3920 ohms, 1/2w, 1%	042-957
R16	Resistor, Fixed, DF, 4750 ohms, 1/2w, 1%	042-958
R14	Resistor, Fixed, DF, 5900 ohms, 1/2w, 1%	042-959
R12	Resistor, Fixed, DF, 7150 ohms, 1/2w, 1%	042-960
R9	Resistor, Fixed, DF, 8870 ohms, 1/2w, 1%	042-961
R27	Resistor, Fixed, DF, 10.5 ohms, 1/2w, 1%	042-963
R23	Resistor, Fixed, DF, 11.5 ohms, 1/2w, 1%	042-965
R21	Resistor, Fixed, DF, 12.1 ohms, 1/2w, 1%	042-966
R19	Resistor, Fixed, DF, 12.7 ohms, 1/2w, 1%	042-967
R17	Resistor, Fixed, DF, 13.3 ohms, 1/2w, 1%	042-968
R35	Resistor, Fixed, DF, 17.4 ohms, 1/2w, 1%	042-969
R13	Resistor, Fixed, DF, 14.7 ohms, 1/2w, 1%	042-970

ETCHED BOARD NO. 2  
Assembly  
DRIVER AMP. — COLORTEC  
Schematic No. 54145

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
R36	Resistor, Fixed, WW, 549 ohms, 1.5w, 1%	043-529
R41	Resistor, Fixed, WW, 750 ohms, 1w, 1%	043-974
R42	Resistor, Fixed, WW, 1000 ohms, ½w, 1%	043-975
R30	Resistor, Fixed, WW, 7.5 ohms, ½w, 1%	043-978
R52	Resistor, Fixed, WW, 5.1 ohms, ½w, 5%	043-980
R51, 53	Resistor, Fixed, WW, 220 ohms, ½w, 0.25%	043-981
R8	Resistor, Fixed, WW, 110 ohms, 3w, 1%	043-982
R44, 54	Resistor, Fixed, WW, 200 ohms, 3w, 0.25%	043-983
R1, 48	Resistor, Variable, 5k, ¼w, 10%	044-973
R56	Resistor, Variable, 1k, ¼w, 10%	044-974
Ref. 4, 5, 6	Grease, Silicone, D-C #4	087-063
TP1, 2, 3	Connector, Plug, Male, 18 Contacts	145-991
Ref. Q1, 2	Test Point, White	148-028
Ref. Q3, 4, 5	Spacer	280-991
	Spacer	280-998
	Rivet	460-068
	Screw, Mach, Binder Hd, Slt'd Dr, ¼ Lg 2-56 X	471-584
	Nut, Hex, #8-32, 5/16, A.C.F.	492-035
	Washer, Lock, #8, Int. Tooth	502-026
	Washer, Fiber	503-010
	Tubing, Teflon, #20	600-036

.



50126

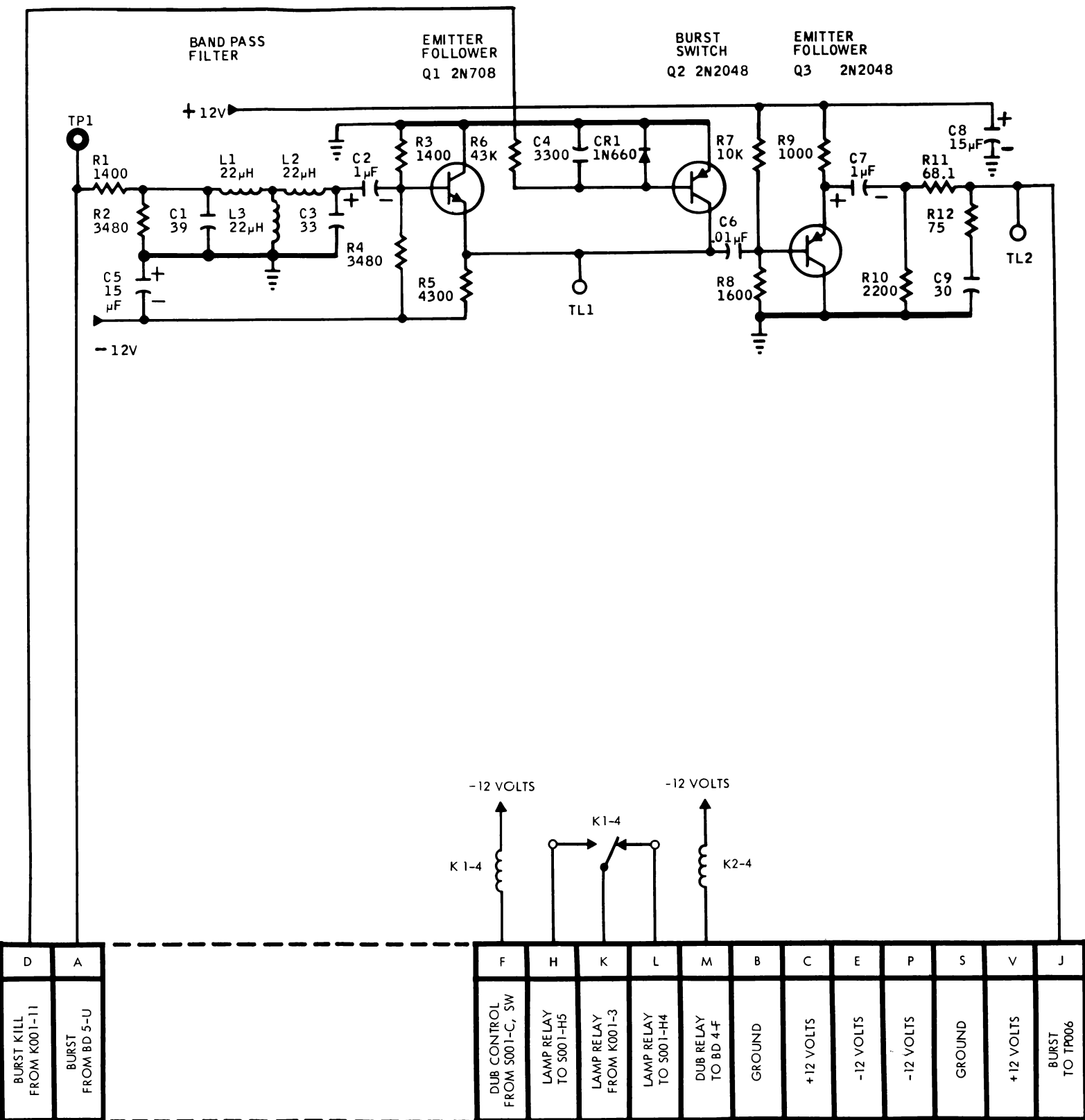
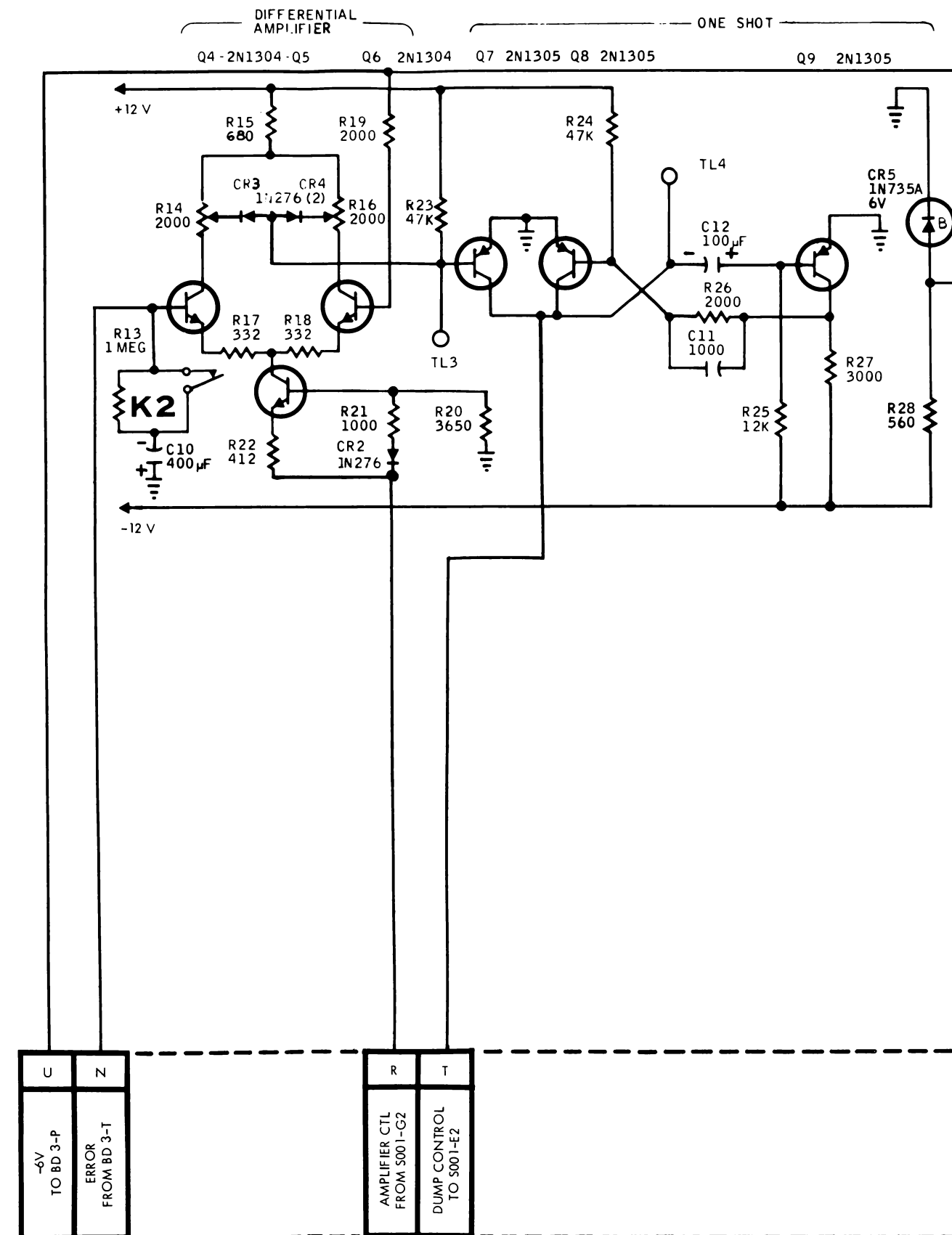
102388

COLORTEC ETCHED BOARD #3  
Catalog Number 52966-01

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
	Handle, Snap On Circuit Board	C-52528-01
	Etched Board Subassembly	C-52965-01
T1	Transformer, Cup Core, Spec. Dwg. (See Note 1)	C-58591-01
T2	Transformer Pulse	B-58511-01
	Label, Identification: Colortec E.B. 3	B-55379-01
CR1, 2, 3, 4	Diode, 1N660	013-985
Q1, 2, 4, 7	Transistor, 2N1304	014-105
Q6	Transistor, 2N708	014-137
Q3, 12	Transistor, 2N1309	014-986
Q13	Transistor, 2N1308	014-987
Q5, 9, 10, 11, 14, 15	Transistor, 2N1305	014-988
Q8	Transistor, (2N600) Req. Dwg.	B-58203-01
	Cement, Eastman 910	018-019
Ref. Item 83	Adhesive, Lock-Tite Grade "A"	018-028
K1	Relay, Mercury	020-139
C14, 24	Capacitor, Mica, 1000pf, 500v, 5%	034-153
C2, 7	Capacitor, Mica, 100pf, 500v, 5%	034-177
C4	Capacitor, Mica, 300pf, 500v, 5%	034-199
C8	Capacitor, Mica, 200pf, 500v, 5%	034-286
C10, 13	Capacitor, Mica, 470pf, 300v, 5%	034-214
C9	Capacitor, Mica, 4700pf, 500v, 5%	034-234
C3	Capacitor, Mica, 3000pf, 500v, 5%	034-924
C12	Capacitor, Mica, 270pf, 500v, 5%	034-319
C6, 16	Capacitor, Mica, 1500pf, 500v, 5%	034-970
C5, 11, 17, 20, 21	Capacitor, Tant., Pol., 15 mfd, 20v, 20%	037-990
C19	Capacitor, Tant., Pol., 22 mfd, 15v, 10%	037-991
C1, 15, 22	Capacitor, Tant., Pol., 1 mfd, 35v, 20%	037-994
C18	Capacitor, Tant., Pol., 47 mfd, 20v, 20%	037-999
R46	Resistor, Fixed, Comp, 10 ohms, 1/2w, 5%	041-002
R14	Resistor, Fixed, Comp, 100 ohms, 1/2w, 5%	041-003
R36	Resistor, Fixed, Comp, 220 ohms, 1/2w, 5%	041-004
R32	Resistor, Fixed, Comp, 750 ohms, 1/2w, 5%	041-007
R12	Resistor, Fixed, Comp, 1.8k, 1/2w, 5%	041-009
R9, 16, 26	Resistor, Fixed, Comp, 2k, 1/2w, 5%	041-010
R4, 30	Resistor, Fixed, Comp, 4.7k, 1/2w, 5%	041-013
R23, 24, 25	Resistor, Fixed, Comp, 10k, 1/2w, 5%	041-014
R15, 28	Resistor, Fixed, Comp, 39k, 1/2w, 5%	041-018
R31	Resistor, Fixed, Comp, 1k, 1w, 5%	041-102
R2, 7	Resistor, Fixed, Comp, 2.2k, 1/2w, 5%	041-239
R17	Resistor, Fixed, Comp, 1k, 1/2w, 5%	041-245
R1, 13	Resistor, Fixed, Comp, 75k, 1/2w, 5%	041-253
R10	Resistor, Fixed, Comp, 82 ohms, 1/2w, 5%	041-277
R34	Resistor, Fixed, Comp, 120k, 1/2w, 5%	041-318
R11	Resistor, Fixed, Comp, 330 ohms, 1/2w, 5%	041-329
R8	Resistor, Fixed, Comp, 200 ohms, 1/2w, 5%	041-334
R3, 5	Resistor, Fixed, Comp, 470 ohms, 1/2w, 5%	041-336
R45	Resistor, Fixed, Comp, 9.1k, 1/2w, 5%	041-373
R22, 29, 35	Resistor, Fixed, Comp, 12k, 1/2w, 5%	041-420
R27	Resistor, Fixed, Comp, 1.3k, 1/2w, 5%	041-462
R21	Resistor, Fixed, Comp, 33 ohms, 1/2w, 5%	041-489
R41, 43, 6	Resistor, Fixed, Comp, 3.6k, 1/2w, 5%	041-525
R33	Resistor, Fixed, Comp, 11k, 1/2w, 5%	041-604
R20	Resistor, Fixed, DF, 10k, 1/2w, 1%	042-081
R42	Resistor, Fixed, DF, 200 ohms, 1/2w, 1%	042-167
R19	Resistor, Fixed, DF, 9090 ohms, 1/2w, 1%	042-187
R39, 40	Resistor, Fixed, DF, 2k, 1/2w, 1%	042-205
R18	Resistor, Fixed, DF, 1780 ohms, 1/2w, 1%	042-210
R38	Resistor, Fixed, DF, 280 ohms, 1/2w, 1%	042-937
R37	Resistor, Fixed, DF, 102 ohms, 1/2w, 1%	042-938
R44	Resistor, Variable, 1k, 1/4w, 10%	044-209
	Connector, Plug, Male, 18 Pin	145-991

ETCHED BOARD NO. 3  
Assembly  
SYNC FEEDBACK, COLOTEC  
Schematic No. 54145

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
TPI	Test Point, White	148-028
Ref. Q6	Spacer, Transistor	280-991
Ref. Q1, 2	Spacer, Transistor	280-998
	Screw, Mach., Fill. Hd., Slit., 2-56 x 3/4	471-760
	Nut, Hex., #2	492-001
	Rivet, .125 Dia x .500 long	460-068
	Washer, Fibre, 1/8 ID, 1/4 OD x 1/32 thk	503-010
	Washer, Flat, #2 x .016 thk	501-007
	Washer, Nylon #2	503-054
	Tubing, Teflon, #20	600-036
	Wire, Bare, #22	615-002
	Note 1: For internal use see dwg. #C-55431-01	



50127

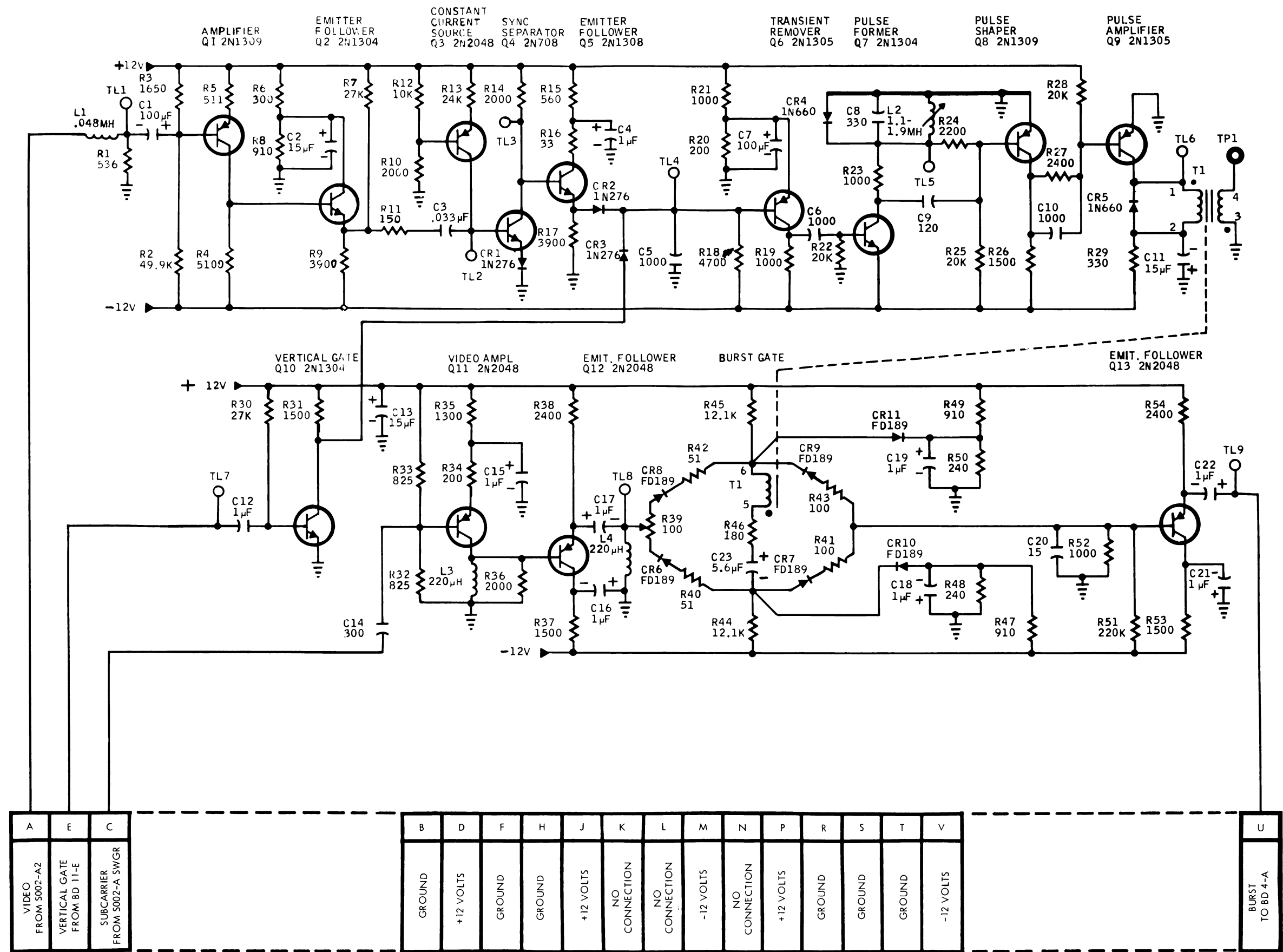
102390

COLORTEC ETCHED BOARD #4  
Catalog Number 52972-01



<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
	Handle, Snap On Circuit Board	C-52528-01
	Etched Board Subassembly	C-52971-01
	Label, Identification, Colortec E.B. 4	B-55379-01
CR5	Diode, Zener, 1N753A	013-257
CR1	Diode, 1N660	013-985
CR2, 3, 4	Diode, 1N276	013-986
Ref. Q3	Heat Sink, Black	014-094
Q4, 5, 6	Transistor, 2N1304	014-105
Q1	Transistor, 2N708	014-137
Q2, 3	Transistor, 2N2048	014-173
Q7, 8, 9	Transistor, 2N1305	014-988
	Cement, Eastman #910	018-019
K1, 2	Relay, Mercury-Wetted, 1 pole 2 throw	020-139
C4	Capacitor, Disc, Ceramic, .0033 mfd, 500v, 10%	030-116
C9	Capacitor, Silver Mica, 30pf, 500v, 5%	034-208
C1	Capacitor, Silver Mica, 39pf, 500v, 1%	034-251
C3	Capacitor, Silver Mica, 33pf, 500v, $\pm 0.5$ pf	034-376
C11	Capacitor, Silver Mica, 1000pf, 500v, 5%	034-153
C6	Capacitor, Mylar, Tub., .01 mfd, 50v, $\pm 10\%$	035-417
C12	Capacitor, Pol., Tant, 100 mfd, 20v, 20%	037-101
C5, 8	Capacitor, Pol., Tant, 15 mfd, 20v, 20%	037-990
C2, 7	Capacitor, Pol., Tant, 1 mfd, 35v, 20%	037-994
C10	Capacitor, Pol., Tant, 400 mfd., 15v, $-15 + 75\%$	037-995
R19, 26	Resistor, Fixed, Comp, 2k, $\frac{1}{2}w$ , 5%	041-010
R5	Resistor, Fixed, Comp, 4.3k, $\frac{1}{2}w$ , 5%	041-012
R7	Resistor, Fixed, Comp, 10k, $\frac{1}{2}w$ , 5%	041-014
R6	Resistor, Fixed, Comp, 43k, $\frac{1}{2}w$ , 5%	041-019
R23, 24	Resistor, Fixed, Comp, 47k, $\frac{1}{2}w$ , 5%	041-020
R10	Resistor, Fixed, Comp, 2.2k, $\frac{1}{2}w$ , 5%	041-239
R9	Resistor, Fixed, Comp, 1k, $\frac{1}{2}w$ , 5%	041-245
R15	Resistor, Fixed, Comp, 680 ohms, $\frac{1}{2}w$ , 5%	041-343
R13	Resistor, Fixed, Comp, 1 meg, $\frac{1}{2}w$ , 5%	041-286
R25	Resistor, Fixed Comp, 12k, $\frac{1}{2}w$ , 5%	041-420
R27	Resistor, Fixed, Comp, 3k, $\frac{1}{2}w$ , 5%	041-475
R12	Resistor, Fixed, Comp, 75 ohms, $\frac{1}{2}w$ , 5%	041-516
R8	Resistor, Fixed, Comp, 1.6k, $\frac{1}{2}w$ , 5%	041-526
R28	Resistor, Fixed, Comp, 560 ohms, $1w$ , 5%	041-999
Ref. Q3	Grease, Silicone, D-C4	087-063
R2, 4	Resistor, Fixed, DF, 3480 ohms, $\frac{1}{2}w$ , 1%	042-400
R21	Resistor, Fixed, DF, 1k, $\frac{1}{2}w$ , 1%	042-075
R17, 18	Resistor, Fixed, DF, 332 ohms, $\frac{1}{2}w$ , 1%	042-223
R20	Resistor, Fixed, DF, 3.65k, $\frac{1}{2}w$ , 1%	042-286
R11	Resistor, Fixed, DF, 68.1 ohms, $\frac{1}{2}w$ , 1%	042-393
R22	Resistor, Fixed, 412 ohms, $\frac{1}{2}w$ , 1%	042-396
R1, 3	Resistor, Fixed, 1400 ohms, $\frac{1}{2}w$ , 1%	042-952
R14, 16	Resistor, Variable, 2k, $\frac{1}{4}w$ , $\pm 10\%$	044-975
TP1	Connector Plug, Male, 18 Pin	145-991
Ref. Q1	Test Point, White	148-028
Q2 thru 9	Spacer, Transistor	280-991
	Spacer, Transistor	280-998
	Rivet	460-068
	Screw, Mach., Pan Hd, Sltd Dr, 2-56 x $\frac{3}{4}$ Lg.	471-799
	Nut, Hex, 2-56	492-007
	Washer, Flat, #2, Int. Tooth	502-029
	Washer, Fibre, $\frac{1}{8}$ ID, $\frac{1}{4}$ OD x $\frac{1}{32}$	503-010
L1, 2, 3	Inductor, Fixed, 22 $\mu$ HY, 1.25%	540-058
	Tubing, Teflon, #20	600-036
	Wire, Bare, #22	615-002

ETCHED BOARD NO. 4  
Assembly  
SYNC FEEDBACK, BURST FILTER,  
DUB LAMP RELAY, COLORTEC  
Schematic No. 54145



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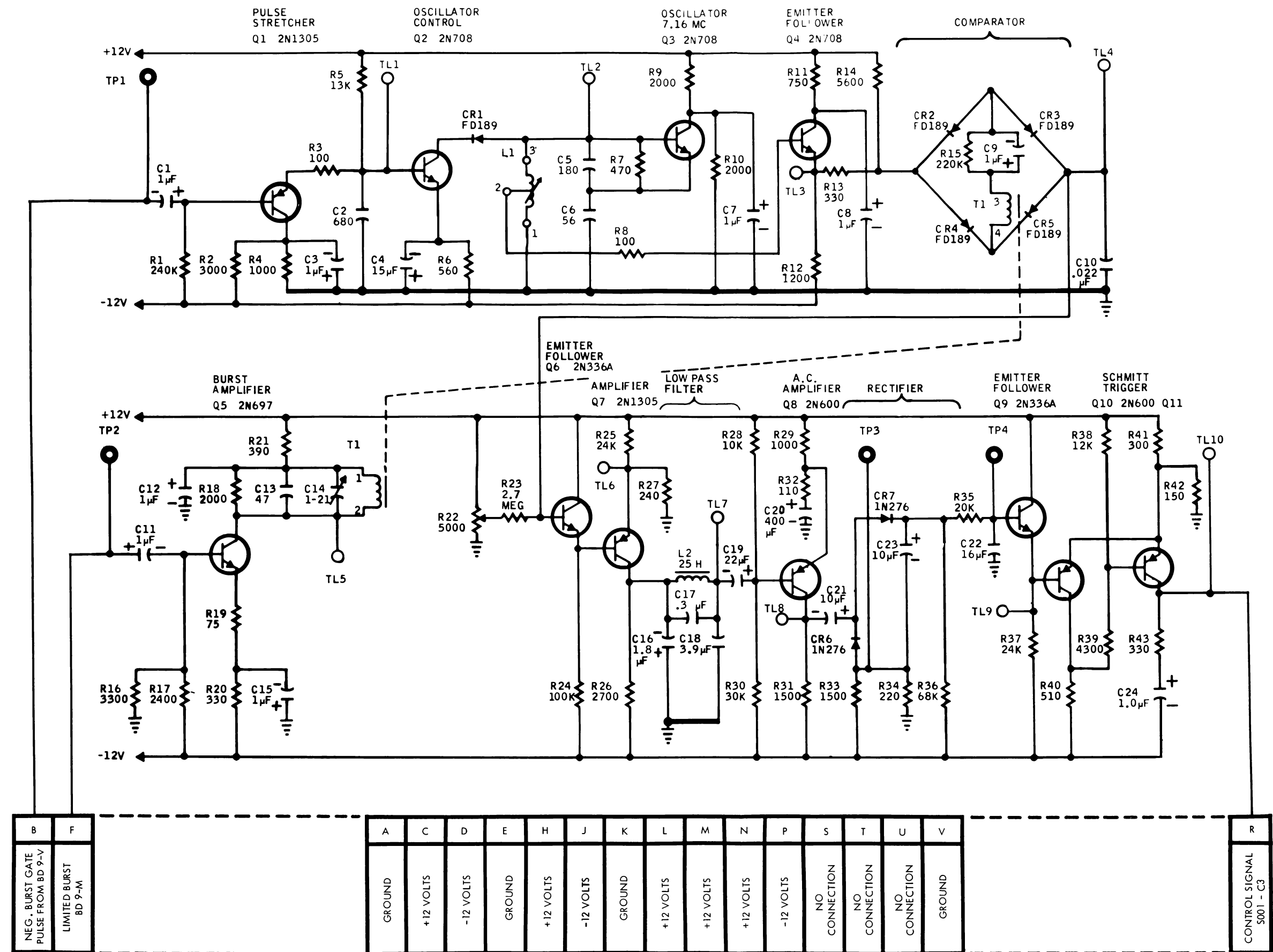
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COLORTEC ETCHED BOARD #5  
Catalog Number 52954-01

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
L2	Inductor, Variable, 1.1-1.9 MH	D-51979-01
	Handle, Snap On Circuit Board	C-52528-01
	Shield, Brass	C-52946-01
	Etched Board Subassembly	C-52953-01
T1	Transformer, Spec. Dwg. (See note 1)	C-58592-01
	Identification, Label, Colortec E.B. 5	B-55379-01
	Identification, Label, Colortec E.B. 11	B-55379-01
CR6, 7, 8, 9, 10, 11	Diode, FD189	013-259
CR4, 5	Diode, 1N660	013-985
CR1, 2, 3	Diode, 1N276	013-986
Q11	Heat Sink, Black	014-094
Ref. Q1, 2	Heat Sink, Red	014-070
Q2, 7, 10	Transistor, 2N1304	014-105
Q4	Transistor, 2N708	014-137
Q3, 11, 12, 13	Transistor, 2N2048	014-173
Q1, 8	Transistor, 2N1309	014-986
Q5	Transistor, 2N1308	014-987
Q6, 9	Transistor, 2N1305	014-988
	Cement, Eastman #910	018-019
C8	Capacitor, Silver Mica, 330pf, 500v, 5%	034-212
C14	Capacitor, Silver Mica, 300pf, 500v, 1%	034-287
C5, 6, 10	Capacitor, Silver Mica, 1000pf, 100v, 5%	034-950
C9	Capacitor, Silver Mica, 120pf, 500v, 5%	034-961
C20	Capacitor, Silver Mica, 15pf, 500v, 5%	034-963
C3	Capacitor, Tubular, Mylar, .033 mfd, 100v, 5%	035-412
C1, 7	Capacitor, Tant., 100 mfd, 20v, 20%	037-101
C12	Capacitor, Tant., 1 mfd, 40v, 20%, non-pol	037-172
C23	Capacitor, Tant., 5.6 mfd, 6v, 10%	037-174
C2, 11, 13	Capacitor, Tant., 15 mfd, 20v, 20%, pol	037-990
C4, 15, 16	Capacitor, Tant., 1 mfd, 35v, 20%, pol	037-994
R35	Resistor, Fixed, Comp, 750 ohms, 1/2w, 5%	041-007
R26, 31, 37	Resistor, Fixed, Comp, 1.5k, 1/2w, 5%	041-008
R10, 14	Resistor, Fixed, Comp, 2k, 1/2w, 5%	041-010
R18	Resistor, Fixed, Comp, 4.7k, 1/2w, 5%	041-013
R12	Resistor, Fixed, Comp, 10k, 1/2w, 5%	041-014
R7, 30	Resistor, Fixed, Comp, 27k, 1/2w, 5%	041-015
R24	Resistor, Fixed, Comp, 2.2k, 1/2w, 5%	041-239
R19, 21, 23	Resistor, Fixed, Comp, 1k, 1/2w, 5%	041-245
R15	Resistor, Fixed, Comp, 560 ohms, 1/2w, 5%	041-256
R9, 17	Resistor, Fixed, Comp, 3.9k, 1/2w, 5%	041-303
R27, 38, 54	Resistor, Fixed, Comp, 2.4k, 1/2w, 5%	041-316
R29	Resistor, Fixed, Comp, 330 ohms, 1/2w, 5%	041-329
R20	Resistor, Fixed, Comp, 200 ohms, 1/2w, 5%	041-334
R40, 42	Resistor, Fixed, Comp, 51 ohms, 1/2w, 5%	041-345
R51	Resistor, Fixed, Comp, 220k, 1/4w, 5%	041-432
R46	Resistor, Fixed, Comp, 180 ohms, 1/2w, 5%	041-461
R48, 50	Resistor, Fixed, Comp, 240 ohms, 1/2w, 5%	041-473
R16	Resistor, Fixed, Comp, 33 ohms, 1/2w, 5%	041-489
R13	Resistor, Fixed, Comp, 24k, 1/2w, 5%	041-498
R11	Resistor, Fixed, Comp, 150 ohms, 1/2w, 5%	041-282
R8, 47, 49	Resistor, Fixed, Comp, 910 ohms, 1/2w, 5%	041-522
R6	Resistor, Fixed, Comp, 300 ohms, 1/2w, 5%	041-528
R22, 25, 28	Resistor, Fixed, Comp, 20k, 1/2w, 5%	041-529
R32	Resistor, Fixed, D.F., 1050 ohms, 1/2w, 1%	042-943
R33	Resistor, Fixed, D.F., 681 ohms, 1/2w, 1%	042-074
R52	Resistor, Fixed, D.F., 1k, 1/2w 1%	042-075
R34	Resistor, Fixed, D.F., 200 ohms, 1/2w, 1%	042-167

ETCHED BOARD NO. 5 & 11  
Assembly  
BURST GATE & SYNC STRIPPER, COLORTEC  
Schematic No. 54145

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
R41, 43	Resistor, Fixed, D.F., 100 ohms, 1/2w, 1%	042-174
R36	Resistor, Fixed, D.F., 2k, 1/2w, 1%	042-205
R44, 45	Resistor, Fixed, D.F., 12.1k, 1/2w, 1%	042-290
R1	Resistor, Fixed, D.F., 536 ohms, 1/2w, 1%	042-366
R3	Resistor, Fixed, D.F., 1650 ohms, 1/2w, 1%	042-399
R5	Resistor, Fixed, D.F., 511 ohms, 1/2w, 1%	042-947
R4	Resistor, Fixed, D.F., 5.11k, 1/2w, 1%	042-948
R2	Resistor, Fixed, MF, 49.9k, 1/2w, 1%	042-434
R39	Resistor, Var., Carbon, 100 ohms, 1/4w, 10%	044-291
Ref. Q1, 2, 11	Grease, Silicone, D-C #4	087-063
	Connector, Plug, Male, 18 Pin	145-991
TP1	Test Point, White	148-028
Ref. Q4	Spacer, Transistor	280-991
Ref. Q1, 2	Spacer, Transistor	280-998
	Rivet	460-068
	Nut, Hex, #2-56	492-007
T1	Washer, Fibre, 1/8 ID, 1/4 OD x 1/32	503-010
L3, 4	Inductor, Fixed, 220 μHY, ±5%	540-003
L1	Inductor, Fixed, 48 μH, 2.5%	051-096
	Tubing, Teflon, #20	600-036
	Wire, Bare #22	615-002
	Tubing, Non-Metallic, Clear	600-084
	Note 1: For internal use	
	See Dwg #C-55428-01	



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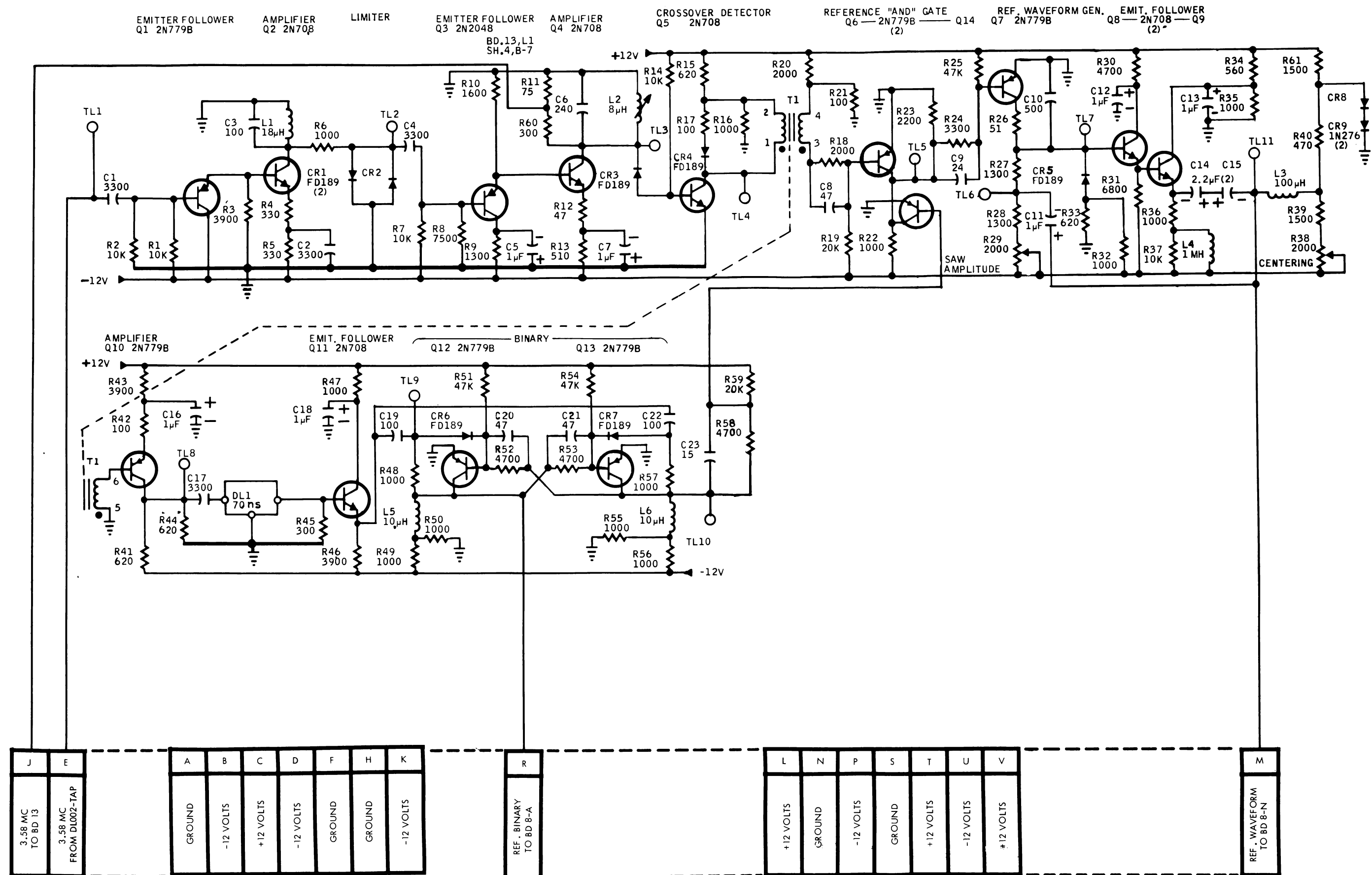
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COLORTEC ETCHED BOARD #6  
Catalog Number 52974-01

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
	Handle, Snap-On Circuit Board	C-52528-01
	Etched Board Subassembly	C-52973-01
T1	Toroid, Spec. Dwg. (See note 1)	C-58257-01
Q8, 10, 11	Transistor, Reg. Dwg. (2N600)	B-58203-01
L1	7.16 MC Osc. Coil (shielded coil assy)	B-58396-01
	Label, Identification: Colortec E.B. 6	B-55379-01
CR1, 2, 3, 4, 5	Diode, FD189	013-259
CR6, 7	Diode, 1N276	013-986
Ref. Q5	Heat Sink, Red	014-070
Q5	Transistor, 2N697	014-090
Ref. Q10, 11	Heat Sink, Black	014-094
Q2, 3, 4	Transistor, 2N708	014-317
Q6, 9	Transistor, 2N336A	014-984
Q1, 7	Transistor, 2N1305	014-988
	Cement, Eastman #910	018-019
C13	Capacitor, Mica, 47pf, 500v, 5%	034-181
C6	Capacitor, Mica, 56pf, 500v, 5%	034-182
C5	Capacitor, Mica, 180pf, 500v, 5%	034-347
C2	Capacitor, Mica, 680pf, 500v, 5%	034-927
C17	Capacitor, Tubular, Mylar, 0.3 mfd, 50v, 2%	035-413
C10	Capacitor, Tubular, Mylar, .022 mfd, 50v, 10%	035-416
C19	Capacitor, Tant., Pol, 22 mfd, 35v, 20%	037-025
C18	Capacitor, Tant., Pol, 3.9 mfd, 35v, 10%	037-104
C21, 23	Capacitor, Tant., Pol, 10 mfd, 20v, 10%	037-109
C16	Capacitor, Tant., Pol, 1.8 mfd, 35v, 10%	037-168
C22	Capacitor, Tant., Non-Pol, 16 mfd, 20v, 10%	037-171
C4	Capacitor, Tant., Pol, 15 mfd, 20v, 20%	037-990
C1, 3, 7	Capacitor, Tant., Pol, 1 mfd, 35v, 20%	037-994
C20	Capacitor, Tant., Pol, 400 mfd, 15v, +75% -15%	037-995
C14	Capacitor, Variable, 1-21pf	038-038
R3, 8	Resistor, Fixed, Comp, 100Ω, 1/2w, 5%	041-003
R34	Resistor, Fixed, Comp, 220 ohms, 1/2w, 5%	041-004
R11	Resistor, Fixed, Comp, 750 ohms, 1/2w, 5%	041-007
R31, 33	Resistor, Fixed, Comp, 1.5k, 1/2w, 5%	041-008
R9, 10, 18	Resistor, Fixed, Comp, 2k, 1/2w, 5%	041-010
R39	Resistor, Fixed, Comp, 4.3k, 1/2w, 5%	041-012
R36	Resistor, Fixed, Comp, 68k, 1/2w, 5%	041-022
R24	Resistor, Fixed, Comp, 100k, 1/2w, 5%	041-023
R15	Resistor, Fixed, Comp, 220k, 1/2w, 5%	041-027
R4, 29	Resistor, Fixed, Comp, 1k, 1/2w, 5%	041-245
R26	Resistor, Fixed, Comp, 2.7k, 1/2w, 5%	041-278
R40	Resistor, Fixed, Comp, 510 ohms, 2w, 5%	041-313
R17	Resistor, Fixed, Comp, 2.4k, 1/2w, 5%	041-316
R13, 20, 43	Resistor, Fixed, Comp, 330 ohms, 1/2w, 5%	041-329
R16	Resistor, Fixed, Comp, 3.3k, 1/2w, 5%	041-331
R7	Resistor, Fixed, Comp, 470 ohms, 1/2w, 5%	041-336
R21	Resistor, Fixed, Comp, 390 ohms, 1/2w, 5%	041-344
R12	Resistor, Fixed, Comp, 1.2k, 1w, 5%	041-355
R14	Resistor, Fixed, Comp, 5.6k, 1/2w, 5%	041-357
R1	Resistor, Fixed, Comp, 240k, 1/2w, 5%	041-374
R28, 30	Resistor, Fixed, Comp, 15k, 1/2w, 5%	041-254
R38	Resistor, Fixed, Comp, 12k, 1/2w, 5%	041-420
R27	Resistor, Fixed, Comp, 240 ohms, 1/2w, 5%	041-473
R2	Resistor, Fixed, Comp, 3k, 1/2w, 5%	041-475
R5	Resistor, Fixed, Comp, 13k, 1/2w, 5%	041-477
R23	Resistor, Fixed, Comp, 2.7 meg, 1/2w, 5%	041-488
R25, 37	Resistor, Fixed, Comp, 24k, 1/2w, 5%	041-498
R19	Resistor, Fixed, Comp, 75 ohms, 1/2w, 5%	041-516

ETCHED BOARD NO. 6  
Assembly  
NON STANDARD COLOR DETECTOR, COLORTEC

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
R35	Resistor, Fixed, Comp, 20k, 1/2w, 5%	041-529
R6	Resistor, Fixed, Comp, 560 ohms, 1w, 5%	041-999
R32	Resistor, Fixed, DF, 110 ohms, 1/2w, 1%	042-978
R42	Resistor, Fixed, WW, 150 ohms, 1w, 1%	043-525
R41	Resistor, Fixed, WW, 300 ohms, 3w, 1%	043-528
R22	Resistor, Variable, WW, 5k, 1/4w, ±10%	044-973
Ref. Q5, 10, 11	Grease, Silicone, D-C #4	087-063
	Connector, Plug, Male, 18 Pin	145-991
TP4	Test Point, Red	148-027
TP1, 2	Test Point, White	148-028
TP3	Test Point, Black	148-052
Ref. Q2, 3, 4	Spacer, Transistor	280-991
Ref. Q1, 5, 6, 7	Spacer, Transistor	280-998
	Rivet	460-068
	Washer, Fibre, 1/8 ID, 1/4 OD x 1/32	503-010
L2	Inductor, 25 HY	540-054
	Tubing, Teflon, #20	600-036
	Wire, Bare, #22	615-002
	Note 1: For internal use See Dwg #C-55426-01	



50130

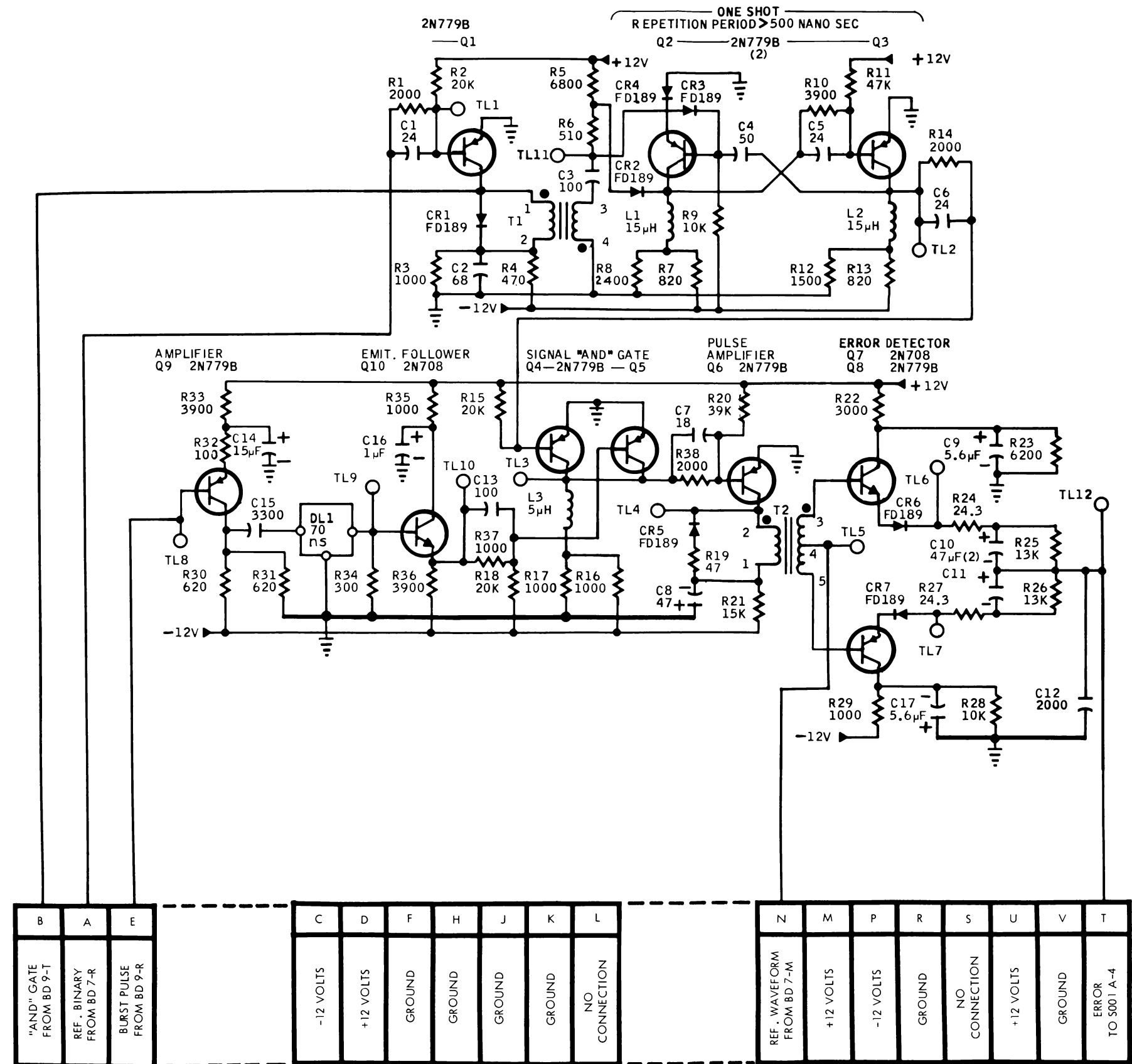
102396

COLORTEC ETCHED BOARD #7  
Catalog Number 52956-01



Schematic Reference	Description	Ampex Part Number
	Handle, Snap On Circuit Board Shield	C-52528-01
	Etched Board, Subassy	C-52947-01
DL1	Pulse Delay Line 133	C-52955-01
T1	Toroid, Spec. Dwg. (See note 1)	B-55343-01
L2	Inductor Variable 8μH	C-58260-01
	Label, Identification, Colortec E.B. 7	B-58742-01
CR1, 2, 3, 4, 5, 6, 7	Diode, FD189	B-55379-01
CR8, 9	Diode, 1N276	013-259
Q2, 4, 5, 8, 9, 11	Transistor, 2N708	013-986
Q3	Transistor, 2N2048	014-137
Q1, 6, 7, 10, 12, 13, 14	Transistor, 2N779A	014-173
	Adhesive, Eastman #910	014-191
Cl, 2, 4, 17	Cap., Ceramic Disc., .0033 mfd, 500v, 10%	018-019
C19, 22	Cap., Mica, 100pf, 500v, 5%	030-116
C8, 20, 21, 9	Cap., Mica, 47pf, 500v, 5%	034-177
C3	Cap., Mica, 100pf, 500v, 1%	034-181
C10	Cap., Mica, 500pf, 300v, 5%	034-222
C6	Cap., Mica, 240pf, 500v, 5%	034-933
C23	Cap., Mica, 15pf, 500v, 5%	034-935
C14, 15	Cap., Tantalum, 2.2 mfd/20v, 10%, pol.	034-963
C5, 7, 11, 12, 13, 16, 18	Cap., Tantalum, 1 mfd, 35v, 20%, pol.	037-989
R17, 21, 42	Resistor, Fixed, Comp, 100, 1/2w, 5%	037-994
R41, 33, 44	Resistor, Fixed, Comp., 620, 1/2w, 5%	041-003
R39, 61	Resistor, Fixed, Comp., 1.5k, 1/2w, 5%	041-006
R18, 20	Resistor, Fixed, Comp., 2k, 1/2w, 5%	041-008
R30, 52, 53, 58	Resistor, Fixed, Comp., 4.7k, 1/2w, 5%	041-010
R1, 2, 14, 7, 37	Resistor, Fixed, Comp., 10k, 1/2w, 5%	041-013
R25, 51, 54	Resistor, Fixed, Comp., 47k, 1/2w, 5%	041-014
R15	Resistor, Fixed, Comp., 620, 1w, 5%	041-020
R36, 49, 56	Resistor, Fixed, Comp., 1k, 1w, 5%	041-101
R23, 24	Resistor, Fixed, Comp., 2.2k, 1/2w, 5%	041-102
R6, 16, 35	Resistor, Fixed, Comp., 1k, 1/2w, 5%	041-239
R34	Resistor, Fixed, Comp., 560, 1/2w, 5%	041-245
R12	Resistor, Fixed, Comp., 47, 1/2w, 5%	041-256
R3, 43, 46	Resistor, Fixed, Comp., 3.9k, 1/2w, 5%	041-283
R4, 5	Resistor, Fixed, Comp., 330, 1/2w, 5%	041-303
R31	Resistor, Fixed, Comp., 6.8k, 1/2w, 5%	041-329
R40	Resistor, Fixed, Comp., 470, 1/2w, 5%	041-330
R26	Resistor, Fixed, Comp., 51, 1/2w, 5%	041-336
R8	Resistor, Fixed, Comp., 7.5k, 1/2w, 5%	041-345
R13	Resistor, Fixed, Comp., 510, 1/2w, 5%	041-361
R9, 27, 28	Resistor, Fixed, Comp., 1.3k, 1/2w, 5%	041-404
R10	Resistor, Fixed, Comp., 1.6k, 1/2w, 5%	041-462
R45	Resistor, Fixed, Comp., 300, 1/2w, 5%	041-526
R19, 59	Resistor, Fixed, Comp., 20k, 1/2w, 5%	041-528
R60	Resistor, Fixed, Comp., 300, 1/4w, 5%	041-529
R11	Resistor, Fixed, Comp., 75, 1/4w, 5%	041-569
R29, 38	Resistor, Variable, Linear 2k, 1/4w, 10%	041-647
	Connector Plug, Male, 18 Pin	044-174
	Spacer, Transistor	145-991
	Spacer, Transistor	280-991
	Rivet, .125 Dia. x .500 Lg	280-998
	Screw, Mach, Rd Hd, Slot Dr, 2-56 x 1/4 Lg	460-068
	Washer, Flat, #2	471-504
	Washer, Fibre, 1/8 ID, 1/4 OD x 1/32	501-007
L3	Inductor, Fixed, 100μh, 5%	503-010
L5, 6	Inductor, Fixed, 10μh, 10%	540-006
L1	Inductor, 18μh, 5%	540-013
L4	Choke, R.F., 1000μh, 5%	540-061
	Tubing, Teflon #20	541-986
	Tubin, Teflon #17	600-036
	Wire, Solid Bare #22 Awg.	600-088
	Wire, Solid Bare #18 Awg.	615-002
	Note 1: For internal use	615-019
	See Dwg. #C-55429-01	

ETCHED BOARD NO. 7  
Assembly  
REF WFM GEN, COLORECT  
Schematic No. 54145

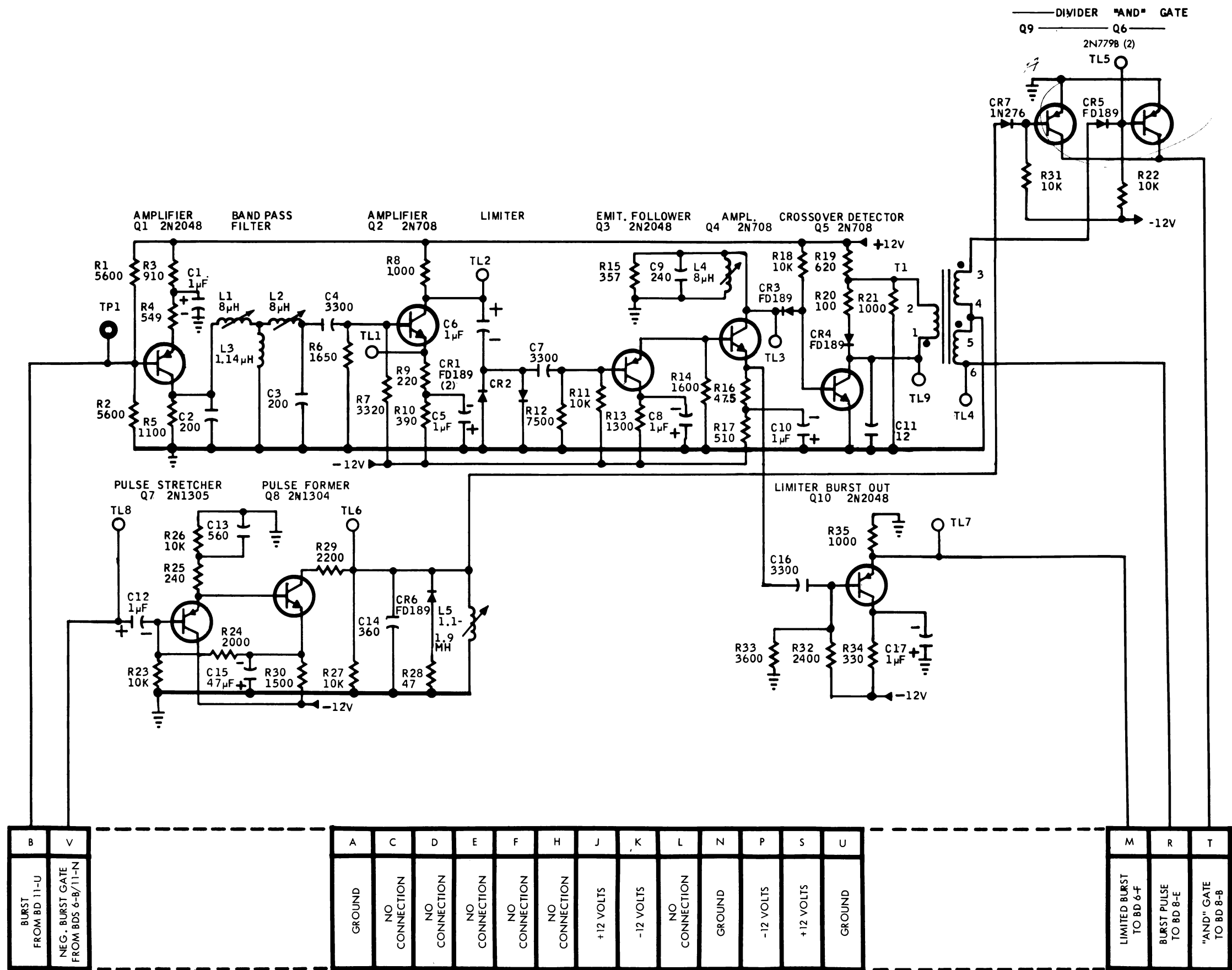


<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
	Handle, Snap On Circuit Board	C-52528-01
	Shield, Epoxy Board	C-52945-01
	Etched Board Subassembly	C-52957-01
DL1	Pulse, Delay Line (PDL 133)	B-55343-01
T1	Toroid, Spec. Dwg. (See Note 1)	C-58258-01
	Toroid, Spec. Dwg. (See Note 2)	C-58259-01
	Label-Identification, Colortec E.B. # 8	B-55379-01
CR1, 2, 3, 4 5, 6, 7	Diode, Silicon, FD189	013-259
Q7, 10	Transistor, 2N708	014-137
Q1, 2, 3, 4 5, 6, 8, 9	Transistor, 2N779A	014-191
	Cement-Eastman #910	018-019
C15	Capacitor, Ceramic, Disc, .0033 mfd, 500v, 10%	030-116
C12	Capacitor, Mica, 2000pf, 500v, 5%	034-161
C3, 13	Capacitor, Mica, 100pf, 500v, 5%	034-177
C2	Capacitor, Mica, 68pf, 500v, 5%	034-184
C7	Capacitor, Mica, 18pf, 500v, 5%	034-206
C1, 5, 6	Capacitor, Mica, 24pf, 500v, 5%	034-207
C4	Capacitor, Mica, 50pf, 500v, 1%	034-248
C9, 17	Capacitor, Tant., Pol, 5.6 mfd, 15v, 10%	037-170
C14	Capacitor, Tant., Pol, 15 mfd, 20v, 20%	037-990
C16	Capacitor, Tant., Pol, 1 mfd, 35v, 20%	037-994
C8, 10, 11	Capacitor, Tant., Pol, 48 mfd, 20v, 20%	037-999
R32	Resistor, Fixed, Comp, 100 ohms, 1/2w, 5%	041-003
R31	Resistor, Fixed, Comp, 620 ohms, 1/2w, 5%	041-006
R12	Resistor, Fixed, Comp, 1.5k, 1/2w, 5%	041-008
R1, 14, 38	Resistor, Fixed, Comp, 2k, 1/2w, 5%	041-010
R28	Resistor, Fixed, Comp, 10k, 1/2w, 5%	041-014
R20	Resistor, Fixed, Comp, 39k, 1/2w, 5%	041-018
R11	Resistor, Fixed, Comp, 47k, 1/2w, 5%	041-020
R30	Resistor, Fixed, Comp, 620 ohms, 1w, 5%	041-101
R16	Resistor, Fixed, Comp, 1k, 1w, 5%	041-102
R8	Resistor, Fixed, Comp, 2.4k, 1/2w, 5%	041-316
R3, 17, 29 35, 37	Resistor, Fixed, Comp, 1k, 1/2w, 5%	041-245
R21	Resistor, Fixed, Comp, 15k, 1/2w, 5%	041-254
R13	Resistor, Fixed, Comp, 820 ohms, 1w, 5%	041-280
R19	Resistor, Fixed, Comp, 47 ohms, 1/2w, 5%	041-283
R10, 33, 36	Resistor, Fixed, Comp, 3.9k, 1/2w, 5%	041-303
R7	Resistor, Fixed, Comp, 820 ohms, 1/2w, 5%	041-317
R5	Resistor, Fixed, Comp, 6.8k, 1/2w, 5%	041-330
R6	Resistor, Fixed, Comp, 510 ohms, 1/2w, 5%	041-404
R4	Resistor, Fixed, Comp, 470 ohms, 2w, 5%	041-453
R23	Resistor, Fixed, Comp, 6.2k, 1/2w, 5%	041-455
R22	Resistor, Fixed, Comp, 3k, 1/2w, 5%	041-475
R34	Resistor, Fixed, Comp, 300 ohms, 1/2w, 5%	041-528
R2, 15, 18	Resistor, Fixed, Comp, 20k, 1/2w, 5%	041-529
R9	Resistor, Fixed, DF, 10k, 1/2w, 1%	042-081
R24, 27	Resistor, Fixed, D.F., 24.3 ohms, 1/2w, 1%	042-390
R25, 26	Resistor, Fixed, D.F., 13k, 1/2w, 1%	042-401
Ref.	Connector, Plug, Male, 18 Pin	145-991
Q1 thru 10	Spacer, Transistor	280-991
	Rivet	460-068
	Screw, Mach., Rd, Sltd Dr, 2-56 x 1/4 Lg	471-504
	Washer, Flat #2	501-007
	Washer, Fibre, 1/8 ID, 1/4 OD x 1/32	503-010
L1, 2	Inductor, Fixed, 15 $\mu$ H, $\pm$ 10%	540-014
L3	Inductor, Fixed, 5 $\mu$ H, 10%	540-060
	Tubing, Teflon, #17	600-088
	Tubing, Teflon, #20	600-036
	Wire, Bare, #18 AWG	615-019

**Notes:**

1. For internal use see  
Dwg # C-55425-01
2. For internal use see  
Dwg # C-55430-01

**ETCHED BOARD NO. 8**  
**Assembly**  
**ERROR DETECTOR — COLORTEC**  
**Schematic No. 54145**



50132

102400

COLORTEC ETCHED BOARD #9  
Catalog Number 52960-01

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
L5	Inductor, Variable, 1.1-1.9 MH Handle, Snap On Circuit Board Shield Etched Board Subassembly Label, Identification: Colortec E.B. 9	D-51979-01 C-52528-01 C-52944-01 C-52959-01 B-55379-01
T1	Toroid, Spec. Dwg. (See note 1)	C-58261-01
L1, 2, 4	Inductor, Variable, 8 $\mu$ HY	B-58742-01
CR1, 2, 3, 4, 5, 6	Diode, FD189	013-259
CR7	Diode, IN276	013-986
Q8	Transistor, 2N1304	014-105
Q2, 4, 5	Transistor, 2N708	014-137
Q1, 3, 10	Transistor, 2N2048	014-173
Q6, 9	Transistor, 2N779A	014-191
	Transistor, 2N1305	014-988
	Cement, Eastman #910	018-019
C4, 7, 16	Capacitor, Disc, Ceramic, .033 mfd, 500v, 10%	030-116
C2, 3	Capacitor, Mica, 200pf, 500v, 1%	034-221
C13	Capacitor, Mica, 560pf, 300v, 5%	034-931
C14	Capacitor, Mica, 360pf, 500v, 5%	034-934
C9	Capacitor, Mica, 240pf, 500v, 5%	034-935
C11	Capacitor, Mica, 12pf, 500v, 5%	034-945
C1, 5, 6, 8, 10, 12, 17	Capacitor, Tant, Pol, 1 mfd, 35v, 20%	037-994
C15	Capacitor, Tant, Pol, 47 mfd, 20v, 20%	037-999
R20	Resistor, Fixed, Comp, 100 ohms, $\frac{1}{2}$ w, 5%	041-003
R9	Resistor, Fixed, Comp, 220 ohms, $\frac{1}{2}$ w, 5%	041-004
R30	Resistor, Fixed, Comp, 1.5k, $\frac{1}{2}$ w, 5%	041-008
R24	Resistor, Fixed, Comp, 2k, $\frac{1}{2}$ w, 5%	041-010
R11, 18, 22, 23, 26, 27,	Resistor, Fixed, Comp, 10k, $\frac{1}{2}$ w, 5%	041-014
R19	Resistor, Fixed, Comp, 620 ohms, 1w, 5%	041-101
R29	Resistor, Fixed, Comp, 2.2k, $\frac{1}{2}$ w, 5%	041-239
R8, 21, 35	Resistor, Fixed, Comp, 1k, $\frac{1}{2}$ w, 5%	041-245
R28	Resistor, Fixed, Comp, 47 ohms, $\frac{1}{2}$ w, 5%	041-283
R32	Resistor, Fixed, Comp, 2.4k, $\frac{1}{2}$ w, 5%	041-316
R34	Resistor, Fixed, Comp, 330 ohms, $\frac{1}{2}$ w, 5%	041-329
R10	Resistor, Fixed, Comp, 390 ohms, $\frac{1}{2}$ w, 5%	041-344
R1, 2	Resistor, Fixed, Comp, 5.6k, $\frac{1}{2}$ w, 5%	041-357
R12	Resistor, Fixed, Comp, 7.5k, $\frac{1}{2}$ w, 5%	041-361
R17	Resistor, Fixed, Comp, 510 ohms, $\frac{1}{2}$ w, 5%	041-404
R13	Resistor, Fixed, Comp, 1.3k, $\frac{1}{2}$ w, 5%	041-462
R25	Resistor, Fixed, Comp, 240 ohms, $\frac{1}{2}$ w, 5%	041-473
R3	Resistor, Fixed, Comp, 910 ohms, $\frac{1}{2}$ w, 5%	041-522
R33	Resistor, Fixed, Comp, 3.6k, $\frac{1}{2}$ w, 5%	041-525
R14	Resistor, Fixed, Comp, 1.6k, $\frac{1}{2}$ w, 5%	041-526
R7	Resistor, Fixed, DF, 3320 ohms, $\frac{1}{2}$ w, 1%	042-217
R4	Resistor, Fixed, DF, 549 ohms, $\frac{1}{2}$ w, 1%	042-397
R6	Resistor, Fixed, DF, 1650 ohms, $\frac{1}{2}$ w, 1%	042-399
R16	Resistor, Fixed, DF, 47.5 ohms, $\frac{1}{2}$ w, 1%	042-405
R15	Resistor, Fixed, DF, 357 ohms, $\frac{1}{2}$ w, 1%	042-942
R5	Resistor, Fixed, DF, 1.1k, $\frac{1}{2}$ w, 1%	042-998
TP1	Connector, Plug, Male, 18 Pin	145-991
Ref. Q2, 4, 5, 6, 9	Test Point, White	148-028
Ref. Q1, 3, 7, 8, 10	Spacer, Transistor	280-991
	Spacer, Transistor	280-998
L3	Rivet, .125 Dia. x 500 long	460-068
	Screw, Binder Hd, 2-56 x $\frac{1}{4}$ Lg	471-584
	Washer, Flat, #2, .016 Thk	501-007
	Washer, Fibre, $\frac{1}{8}$ ID, $\frac{1}{4}$ OD x $\frac{1}{8}$	503-010
	Inductor, Fixed, 1.14 $\mu$ HY, 1%	540-065
	Tubing, Teflon, #20	600-036
	Wire, Bare, #22	615-002
	Note 1: For internal use See Dwg #C-55427-01.	

ETCHED BOARD NO. 9  
Assembly  
SIGNAL WAVEFORM GENERATOR, COLORTEC  
Schematic No. 54145

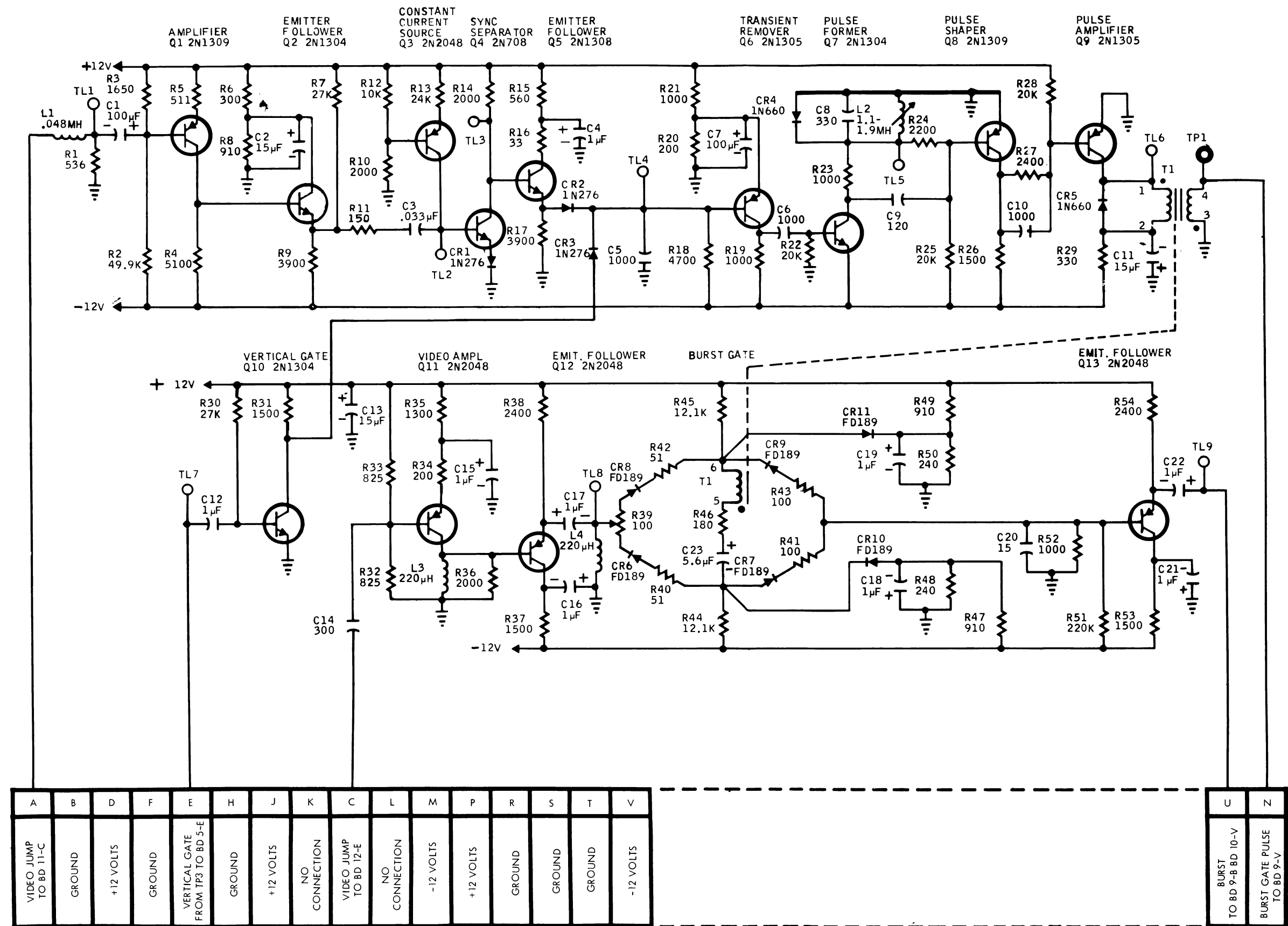


<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
	Handle, Snap On Circuit Board	C-52528-01
	Etched Board Subassembly	C-52967-01
Q11	Transistor, Req. Dwg. (2N600)	B-58203-02
L2	Inductor, Variable, 8 $\mu$ HY, $\pm 10\%$	C-58742-01
	Label, Identification: Colortec E.B. 10	B-55379-01
CR7	Diode, Zener, IN1520A	013-133
CR2, 3, 4	Diode, FD189	013-259
CR1	Diode, Zener, MZ13T5	013-982
CR5, 6	Diode, IN276	013-986
Ref. Q4, 5, 7	Heat Sink, Red	014-070
Q4, 5, 7	Transistor, 2N697	014-090
Ref. Q3, 6	Heat Sink, Black	014-094
Q1, 2	Transistor, 2N708	014-137
Q3, 6	Transistor, 2N2048	014-173
Q8	Transistor, 2N336A	014-984
Q9, 10	Transistor, 2N1305	014-988
	Cement, Eastman #910	018-019
C8	Capacitor, Ceramic, Disc, .0033 mfd, 500v, 10%	030-116
C11	Capacitor, Mica, 270pf, 500v, 5%	034-319
C13	Capacitor, Mica, 820pf, 500v, 5%	034-957
C3	Capacitor, 15pf, 500v, 5%	034-963
C17	Capacitor, Tant., Pol, 22 mfd, 20v, 20%	037-076
C1, 6, 9, 15	Capacitor, Tant., Pol, 15 mfd, 20v, 20%	037-990
C10, 12, 14, 16	Capacitor, Tant., Pol, 1 mfd, 35v, 20%	037-994
C18	Capacitor, Tant., Pol, 10 mfd, 35v, 10%	037-996
C5	Capacitor, Tant., Pol, 100 mfd, 10v, 20%	037-998
C2, 7	Capacitor, Tant., Pol, 47 mfd, 20v, 20%	037-999
C4	Capacitor, Variable, 1-21pf	038-038
R32	Resistor, Fixed, Comp, 100 ohms, $\frac{1}{2}$ w, 5%	041-003
R44	Resistor, Fixed, Comp, 620 ohms, $\frac{1}{2}$ w, 5%	041-006
R7, 26	Resistor, Fixed, Comp, 4.3k, $\frac{1}{2}$ w, 5%	041-012
R29	Resistor, Fixed, Comp, 10k, $\frac{1}{2}$ w, 5%	041-014
R37	Resistor, Fixed, Comp, 39k, $\frac{1}{2}$ w, 5%	041-018
R23	Resistor, Fixed, Comp, 470 ohms, 1w, 5%	041-100
R22	Resistor, Fixed, Comp, 2.2k, $\frac{1}{2}$ w, 5%	041-239
R36	Resistor, Fixed, Comp, 82k, $\frac{1}{2}$ w, 5%	041-246
R24	Resistor, Fixed, Comp, 15k, $\frac{1}{2}$ w, 5%	041-254
R14, 16	Resistor, Fixed, Comp, 560 ohms, $\frac{1}{2}$ w, 5%	041-256
R4	Resistor, Fixed, Comp, 270 ohms, $\frac{1}{2}$ w, 5%	041-273
R5	Resistor, Fixed, Comp, 2.7k, $\frac{1}{2}$ w, 5%	041-278
R6	Resistor, Fixed, Comp, 8.2k, $\frac{1}{2}$ w, 5%	041-309
R25	Resistor, Fixed, Comp, 330 ohms, $\frac{1}{2}$ w, 5%	041-329
R28	Resistor, Fixed, Comp, 3.3k, $\frac{1}{2}$ w, 5%	041-331
R31	Resistor, Fixed, Comp, 680 ohms, $\frac{1}{2}$ w, 5%	041-343
R20	Resistor, Fixed, Comp, 510 ohms, $\frac{1}{2}$ w, 5%	041-404
R27	Resistor, Fixed, Comp, 1.3k, $\frac{1}{2}$ w, 5%	041-462
R2	Resistor, Fixed, Comp, 3k, $\frac{1}{2}$ w, 5%	041-475
R11	Resistor, Fixed, Comp, 24k, $\frac{1}{2}$ w, 5%	041-498
R13	Resistor, Fixed, Comp, 510 ohms, 1w, 5%	041-500
R12	Resistor, Fixed, Comp, 1.6k, $\frac{1}{2}$ w, 5%	041-526
R45	Resistor, Fixed, Comp, 300 ohms, $\frac{1}{2}$ w, 5%	041-528
R8	Resistor, Fixed, Comp, 20k, $\frac{1}{2}$ w, 5%	041-529
R21, 15	Resistor, Fixed, Comp, 91 ohms, 2w, 5%	041-646
R34	Resistor, Fixed, DF, 1k, $\frac{1}{2}$ w, 1%	042-075
R35	Resistor, Fixed, DF, 110k, $\frac{1}{2}$ w, 1%	042-093
R10	Resistor, Fixed, DF, 200 ohms, $\frac{1}{2}$ w, 1%	042-167
R18, 19	Resistor, Fixed, DF, 75 ohms, $\frac{1}{2}$ w, 1%	042-191
R39	Resistor, Fixed, DF, 2k, $\frac{1}{2}$ w, 1%	042-205
R3	Resistor, Fixed, DF, 61.9 ohms, $\frac{1}{2}$ w, 1%	042-261
R30	Resistor, Fixed, DF, 56.2 ohms, $\frac{1}{2}$ w, 1%	042-392
R17	Resistor, Fixed, DF, 402 ohms, $\frac{1}{2}$ w, 1%	042-395
R42	Resistor, Fixed, DF, 20k, $\frac{1}{2}$ w, 1%	042-917
R38, 43	Resistor, Fixed, DF, 3010 ohms, $\frac{1}{2}$ w, 1%	042-921

**ETCHED BOARD NO. 10**  
**Assembly**  
**OUTPUT VIDEO AMPLIFIER**  
**BURST SENSOR — COLORTEC**  
**Schematic No. 54145**

<i>Schematic Reference</i>	<i>Description</i>	<i>Part Number Amplex</i>
R41	Resistor, Fixed, DF, 562 ohms, 1/2w, 1%	042-926
R9	Resistor, Fixed, DF, 280 ohms, 1/2w, 1%	042-937
R33	Resistor, Fixed, DF, 357 ohms, 1/2w, 1%	042-942
R1	Resistor, Fixed, DF, 511 ohms, 1/2w, 1%	042-947
R40	Resistor, Fixed, DF, 16.2k, 1/2w, 1%	042-992
Ref.	Grease, Silicone	087-063
Q3, 4, 5, 6	Connector, Plug, Male, 18 Pin	145-991
TP3	Test Point, Red	148-027
TP1, 4	Test Point, White	148-028
TP2	Test Point, Black	148-052
Ref. Q1, 2	Spacer, Transistor	280-991
Ref. Q3, 4, 5	Spacer, Transistor	280-998
6, 7, 8, 9,		
Ref. CR7	Heat Sink, Blue	435-994
	Rivet, .125 Dia. x .500 Lg.	460-068
	Screw, Sem Pan Hd, Sltd, 4-40 x 1/4,	
	Int. T	475-006
	Washer, Fibre, 1/8 ID, 1/4 OD x 1/32	503-010
L3	Inductor, Fixed, 100 μHY, ±5%	540-006
L1	Inductor, Fixed, 2.2 μHY, 2.5%	541-972
	Tubing, Teflon, #20	600-036
	Wire, Bare, #22	615-002

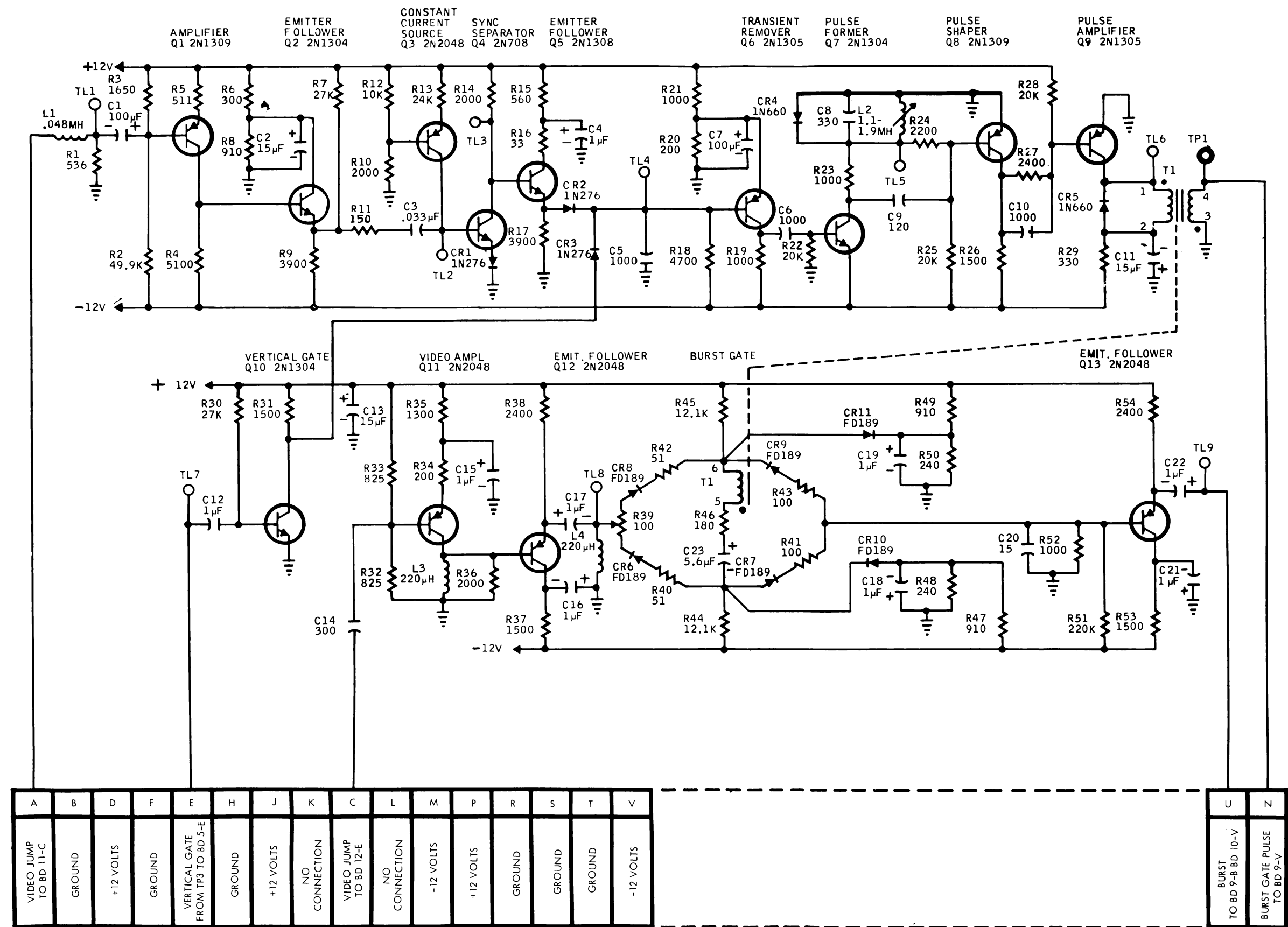




50134

COLORTEC ETCHED BOARD #11  
 Catalog Number 52954-01

102404



50134

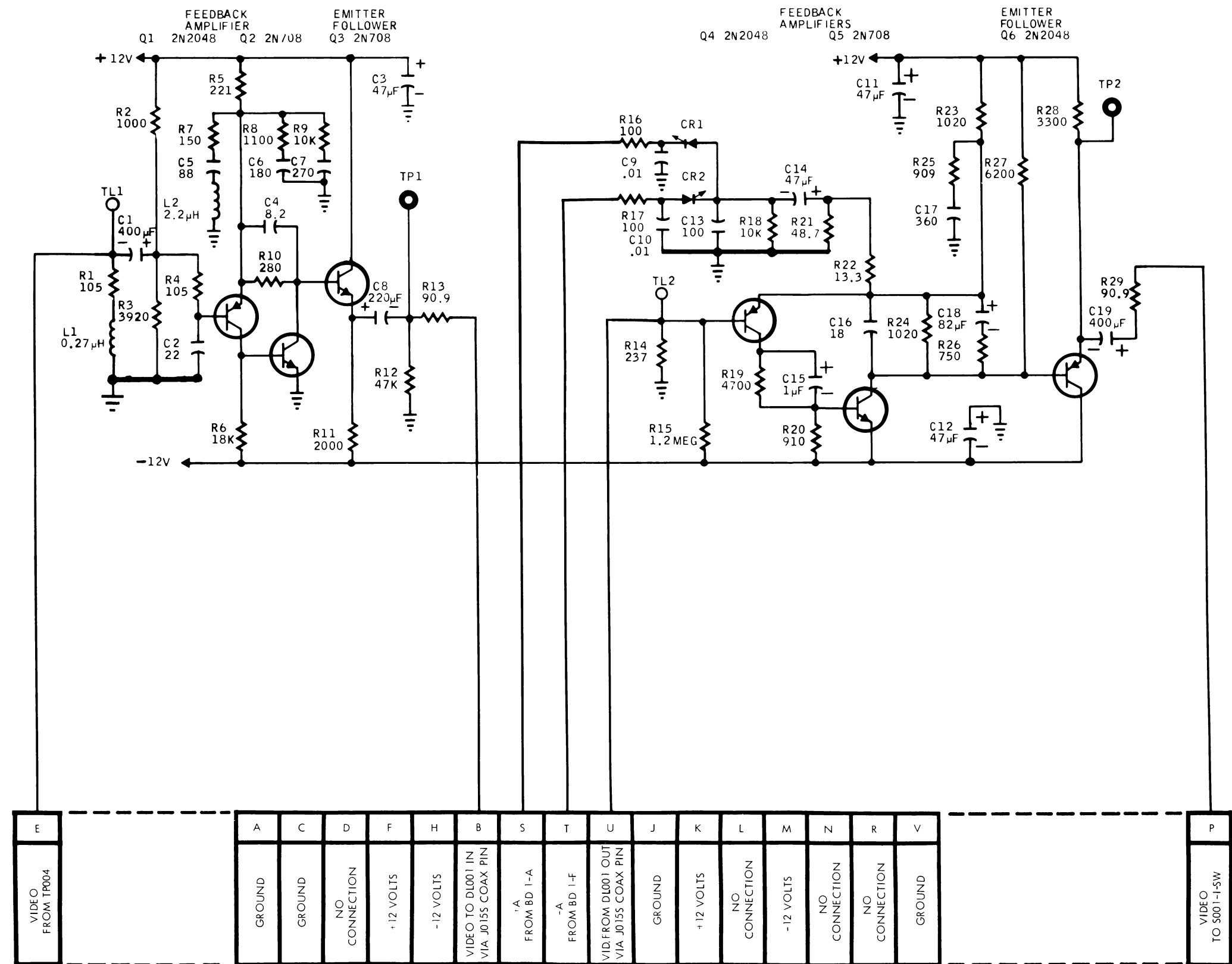
COLORTEC ETCHED BOARD #11  
Catalog Number 52954-01

102404

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
L2	Inductor, Variable, 1.1-1.9 MH	D-51979-01
	Handle, Snap On Circuit Board	C-52528-01
	Shield, Brass	C-52946-01
	Etched Board Subassembly	C-52953-01
T1	Transformer, Spec. Dwg. (See note 1)	C-58592-01
	Identification, Label, Colortec E.B. 5	B-55379-01
	Identification, Label, Colortec E.B. 11	B-55379-01
CR6, 7, 8, 9, 10, 11	Diode, FD189	013-259
CR4, 5	Diode, 1N660	013-985
CR1, 2, 3	Diode, 1N276	013-986
Q11	Heat Sink, Black	014-094
Ref. Q1, 2	Heat Sink, Red	014-070
Q2, 7, 10	Transistor, 2N1304	014-105
Q4	Transistor, 2N708	014-137
Q3, 11, 12, 13	Transistor, 2N2048	014-173
Q1, 8	Transistor, 2N1309	014-986
Q5	Transistor, 2N1308	014-987
Q6, 9	Transistor, 2N1305	014-988
	Cement, Eastman #910	018-019
C8	Capacitor, Silver Mica, 330pf, 500v, 5%	034-212
C14	Capacitor, Silver Mica, 300pf, 500v, 1%	034-287
C5, 6, 10	Capacitor, Silver Mica, 1000pf, 100v, 5%	034-950
C9	Capacitor, Silver Mica, 120pf, 500v, 5%	034-961
C20	Capacitor, Silver Mica, 15pf, 500v, 5%	034-963
C3	Capacitor, Tubular, Mylar, .033 mfd, 100v, 5%	035-412
C1, 7	Capacitor, Tant., 100 mfd, 20v, 20%	037-101
C12	Capacitor, Tant., 1 mfd, 40v, 20%, non-pol	037-172
C23	Capacitor, Tant., 5.6 mfd, 6v, 10%	037-174
C2, 11, 13	Capacitor, Tant., 15 mfd, 20v, 20%, pol	037-990
C4, 15, 16	Capacitor, Tant., 1 mfd, 35v, 20%, pol	037-994
R35	Resistor, Fixed, Comp, 750 ohms, 1/2w, 5%	041-007
R26, 31, 37	Resistor, Fixed, Comp, 1.5k, 1/2w, 5%	041-008
R10, 14	Resistor, Fixed, Comp, 2k, 1/2w, 5%	041-010
R18	Resistor, Fixed, Comp, 4.7k, 1/2w, 5%	041-013
R12	Resistor, Fixed, Comp, 10k, 1/2w, 5%	041-014
R7, 30	Resistor, Fixed, Comp, 27k, 1/2w, 5%	041-015
R24	Resistor, Fixed, Comp, 2.2k, 1/2w, 5%	041-239
R19, 21, 23	Resistor, Fixed, Comp, 1k, 1/2w, 5%	041-245
R15	Resistor, Fixed, Comp, 560 ohms, 1/2w, 5%	041-256
R9, 17	Resistor, Fixed, Comp, 3.9k, 1/2w, 5%	041-303
R27, 38, 54	Resistor, Fixed, Comp, 2.4k, 1/2w, 5%	041-316
R29	Resistor, Fixed, Comp, 330 ohms, 1/2w, 5%	041-329
R20	Resistor, Fixed, Comp, 200 ohms, 1/2w, 5%	041-334
R40, 42	Resistor, Fixed, Comp, 51 ohms, 1/2w, 5%	041-345
R51	Resistor, Fixed, Comp, 220k, 1/4w, 5%	041-432
R46	Resistor, Fixed, Comp, 180 ohms, 1/2w, 5%	041-461
R48, 50	Resistor, Fixed, Comp, 240 ohms, 1/2w, 5%	041-473
R16	Resistor, Fixed, Comp, 33 ohms, 1/2w, 5%	041-489
R13	Resistor, Fixed, Comp, 24k, 1/2w, 5%	041-498
R11	Resistor, Fixed, Comp, 150 ohms, 1/2w, 5%	041-282
R8, 47, 49	Resistor, Fixed, Comp, 910 ohms, 1/2w, 5%	041-522
R6	Resistor, Fixed, Comp, 300 ohms, 1/2w, 5%	041-528
R22, 25, 28	Resistor, Fixed, Comp, 20k, 1/2w, 5%	041-529
R32	Resistor, Fixed, D.F., 1050 ohms, 1/2w, 1%	042-943
R33	Resistor, Fixed, D.F., 681 ohms, 1/2w, 1%	042-074
R52	Resistor, Fixed, D.F., 1k, 1/2w 1%	042-075
R34	Resistor, Fixed, D.F., 200 ohms, 1/2w, 1%	042-167

ETCHED BOARD NO. 5 & 11  
Assembly  
BURST GATE & SYNC STRIPPER, COLORECT  
Schematic No. 54145

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
R41, 43	Resistor, Fixed, D.F., 100 ohms, 1/2w, 1%	042-174
R36	Resistor, Fixed, D.F., 2k, 1/2w, 1%	042-205
R44, 45	Resistor, Fixed, D.F., 12.1k, 1/2w, 1%	042-290
R1	Resistor, Fixed, D.F., 536 ohms, 1/2w, 1%	042-366
R3	Resistor, Fixed, D.F., 1650 ohms, 1/2w, 1%	042-399
R5	Resistor, Fixed, D.F., 511 ohms, 1/2w, 1%	042-947
R4	Resistor, Fixed, D.F., 5.11k, 1/2w, 1%	042-948
R2	Resistor, Fixed, MF, 49.9k, 1/2w, 1%	042-434
R39	Resistor, Var., Carbon, 100 ohms, 1/4w, 10%	044-291
Ref. Q1, 2, 11	Grease, Silicone, D-C #4	087-063
	Connector, Plug, Male, 18 Pin	145-991
TP1	Test Point, White	148-028
Ref. Q4	Spacer, Transistor	280-991
Ref. Q1, 2	Spacer, Transistor	280-998
	Rivet	460-068
	Nut, Hex, #2-56	492-007
T1	Washer, Fibre, 1/8 ID, 1/4 OD x 1/32	503-010
L3, 4	Inductor, Fixed, 220 $\mu$ H, $\pm 5\%$	540-003
L1	Inductor, Fixed, 48 $\mu$ H, 2.5%	051-096
	Tubing, Teflon, #20	600-036
	Wire, Bare #22	615-002
	Tubing, Non-Metallic, Clear	600-084
	Note 1: For internal use See Dwg #C-55428-01	



50135

102406

COLORTEC ETCHED BOARD #12  
Catalog Number 52962-01

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
	Shield, Etched Board	C-52499-01
	Handle, Snap On Circuit Board	C-52528-01
	Etched Board Subassembly	C-52961-01
CR1, 2	SC-11, Silicon Cap., 172pf	C-58249-21
	Label, Identification, Colortec: EB 12	B-55379-01
Ref. Q6	Heat Sink, Black	014-094
Q2, 3, 5	Transistor, 2N708	014-137
Q1, 4, 6	Transistor, 2N2048	014-173
	Cement, Eastman #910	018-019
C4	Capacitor, Ceramic, 8.2pf, 600v	030-988
C16	Capacitor, Mica, 18pf, 500v, 5%	034-206
C13	Capacitor, Mica, 100pf, 500v, 1%	034-222
C17	Capacitor, Mica, 360pf, 500v, 1%	034-241
C2	Capacitor, Mica, 22pf, 500v, 5%	034-269
C6	Capacitor, Mica, 180pf, 500v, 1%	034-297
C7	Capacitor, Mica, 270pf, 500v, 5%	034-319
C5	Capacitor, Mica, 88pf, 500v, 1%	034-374
C9, 10	Capacitor, Tubular, .01 mfd, 50v, 2%	035-950
C18	Capacitor, Tant, 82 mfd, 20v, 10%, Pol	037-169
C8	Capacitor, Tant, 220 mfd, 10v, 20%, Pol	037-993
C15	Capacitor, Tant, 1 mfd, 35v, 20%, Pol	037-994
C1, 19	Capacitor, Tant, 400 mfd, 15v, -15 +75%, Pol	037-995
C14	Capacitor, Tant, 47 mfd, 6v, 20%, Pol	037-997
C3, 11, 12	Capacitor, Tant, 47 mfd, 20v, 20%, Pol	037-999
R19	Resistor, Fixed, Comp, 4.7k, 1/2w, 5%	041-013
R9, 18	Resistor, Fixed, Comp, 10k, 1/2w, 5%	041-014
R12	Resistor, Fixed, Comp, 47k, 1/2w, 5%	041-020
R6	Resistor, Fixed, Comp, 18k, 1/2w, 5%	041-322
R28	Resistor, Fixed, Comp, 3.3k, 1/2w, 5%	041-331
R27	Resistor, Fixed, Comp, 6.2k, 1/2w, 5%	041-455
R15	Resistor, Fixed, Comp, 1.2 meg, 1/2w, 5%	041-476
R20	Resistor, Fixed, Comp, 910 ohms, 1/2w, 5%	041-522
R11	Resistor, Fixed, Comp, 2k, 1w, 5%	041-602
R2	Resistor, Fixed, DF, 1000 ohms, 1/2w, 1%	042-075
R16, 17	Resistor, Fixed, DF, 100 ohms, 1/2w, 1%	042-174
R25	Resistor, Fixed, DF, 909 ohms, 1/2w, 1%	042-208
R7	Resistor, Fixed, DF, 150 ohms, 1/2w, 1%	042-252
R5	Resistor, Fixed, DF, 221 ohms, 1/2w, 1%	042-254
R21	Resistor, Fixed, DF, 48.7 ohms, 1/2w, 1%	042-391
R14	Resistor, Fixed, DF, 237 ohms, 1/2w, 1%	042-394
R24	Resistor, Fixed, DF, 1020 ohms, 1/2w, 1%	042-398
R23	Resistor, Fixed, DF, 1020 ohms, 1w, 1%	042-402
R26	Resistor, Fixed, DF, 750 ohms, 1/2w, 1%	042-910
R10	Resistor, Fixed, DF, 280 ohms, 1/2w, 1%	042-937
R1, 4	Resistor, Fixed, DF, 105 ohms, 1/2w, 1%	042-946
R13, 29	Resistor, Fixed, DF, 90.9 ohms, 1/2w, 1%	042-950
R3	Resistor, Fixed, DF, 3920 ohms, 1/2w, 1%	042-957
R22	Resistor, Fixed, DF, 13.3 ohms, 1/2w, 1%	042-968
R8	Resistor, Fixed, DF, 1100 ohms, 1/2w, 1%	042-995
Ref. Q6	Grease, Silicone, D-C #4	087-063
	Connector, Plug, Male, 18 Pin	145-991
TP1, 2	Test Point, White	148-028
Ref. Q2, 3, 5	Spacer, Transistor	280-991
Ref. Q1, 4, 6	Spacer, Transistor	280-998
	Rivet, .125 Dia. x .500 Lg	460-068
	Washer, Fibre, 1/8 ID, 1/4 OD x 1/32	503-010
L1	Inductor, Fixed, .27 μHY, 5%	540-066
L2	Inductor, Fixed, 2.2 μHY, 2.5%	541-972
	Tubing, Teflon, #20	600-036
	Wire, Bare, #22	615-002

**ETCHED BOARD NO. 12**  
**Assembly**  
**1ST & 2ND VIDEO AMP — COLORTEC**  
**Schematic No. 54145**

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
	Etched Board Subassembly	C-52941-01
L2	Inductor, Variable, 50 $\mu$ HY, $\pm 20$ $\mu$ HY	B-58743-01
CR1	Diode, Zener, 1N1524A	013-258
K1	Relay, 1 Form B, 1 Form A Contacts	020-143
C2	Capacitor, Silver Mica, 39pf, 500v, 5%	034-180
C1	Capacitor, Tant, Pol, 400 mfd, 15v, +75 -15	037-995
R1	Resistor, Fixed, Comp, 680 ohms, 2w, 5%	041-470
R2, 5	Resistor, Fixed, Comp, 150 ohms, 1w, 5%	041-831
R4	Resistor, WW, 300 ohms, 3w, 5%	043-331
R3	Resistor, WW, 100 ohms, 3w, 10%	043-526
R6	Resistor, Var., Carbon, 100 ohms, 1/4 w, Lin, 10%	044-291
	Selected Component Per A.E.S. 12-359, Section 4.24.2 will be one of the following:	
	Inductor, Fixed, 10 $\mu$ HY, 5%	540-057
	Resistor, Fixed, Comp, 110 ohms, 1/4 w, 5%	041-736
	Capacitor, Mica, 200pf, 500v, 1%	034-221

ETCHED BOARD NO. 13  
Assembly  
COLORTEC  
Schematic No. 54145

COLORTEC

Unit

Catalog Number 52650

**Schematic Number** 54145

Issue D Reference Series           

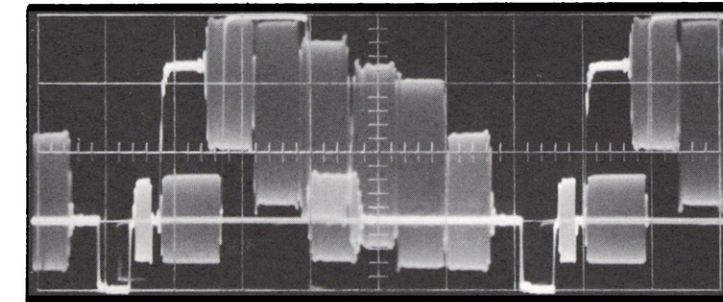
## PEAK-TO-PEAK VOLTAGES

[illegible]

### \* CONDITIONS OF MEASUREMENT

Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
1	10 $\mu$ s	0.25	HOR.	14 pf	75% SAT.	STD. COLOR	
2	10 $\mu$ s	1.0	HOR.	14 pf	COLOR BARS	STD. COLOR	
3	10 $\mu$ s	0.1	HOR.	14 pf	COLOR BARS	STD. COLOR	
4	10 $\mu$ s	0.5	HOR.	14 pf	COLOR BARS	STD. COLOR	
5	10 $\mu$ s	0.25	HOR.	14 pf	COLOR BARS	L.P. FILTER	
6	10 $\mu$ s	2.0	HOR.	14 pf	COLOR BARS	STD. COLOR	
7	2 $\mu$ s	2.5	HOR.	14 pf	COLOR BARS	STD. COLOR	
8	2 $\mu$ s	2.0	HOR.	14 pf	COLOR BARS	STD. COLOR	
9	1 ms	2.0	VERT.	14 pf	COLOR BARS	STD. COLOR	
10	2 $\mu$ s	5.0	HOR.	14 pf	COLOR BARS	STD. COLOR	
11	1 $\mu$ s	5.0	HOR.	14 pf	COLOR BARS	STD. COLOR	
12	1 ms	1.0	VERT.	14 pf	COLOR BARS	STD. COLOR	
13	.5 $\mu$ s	0.5	HOR.	14 pf	COLOR BARS	STD. COLOR	
14	1 $\mu$ s	1.0	HOR.	14 pf	COLOR BARS	STD. COLOR	
15	.5 $\mu$	1.0	HOR.	14 pf	COLOR BARS	STD. COLOR	— S002 IN
16	.5 $\mu$ s	0.5	HOR.	14 pf	COLOR BARS	STD. COLOR	— "REF. BURST" POSITION

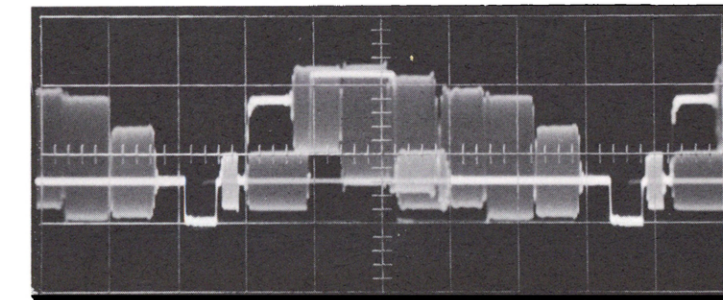
— S002 IN  
— "REF. BURST  
POSITION



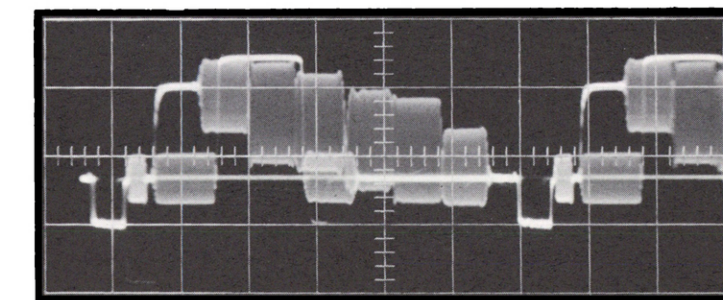
TP004

SAME AS TP004

TL 1-12



TP 1-12



TL 2-12

NOTE: WHERE GROUND IS REFERRED TO UNDER CONDITIONS OF MEASUREMENT, GROUND IS INDICATED ON THE APPROPRIATE PHOTOGRAPH BY A BRIGHT HORIZONTAL TRACE.



COLORTEC

Unit

**Catalog Number** 52650

**Schematic Number** 54145

Issue D

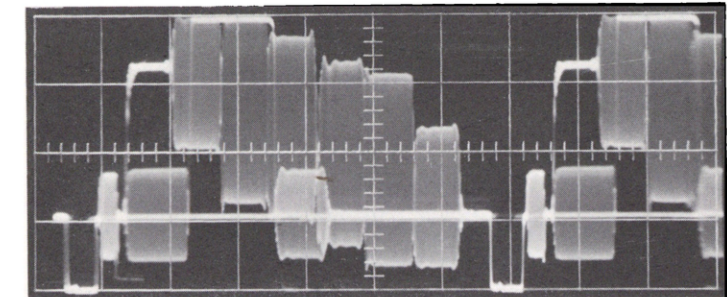
## Reference Series

## PEAK-TO-PEAK VOLTAGES

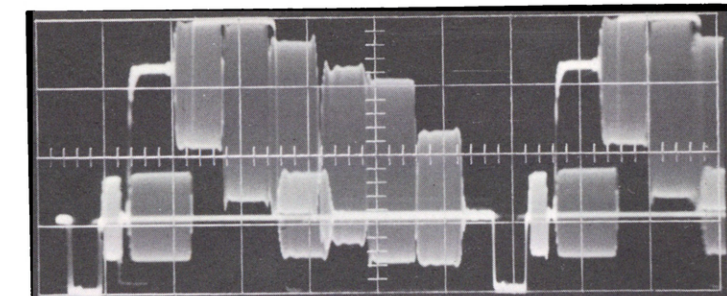
[illegible]

### \* CONDITIONS OF MEASUREMENT

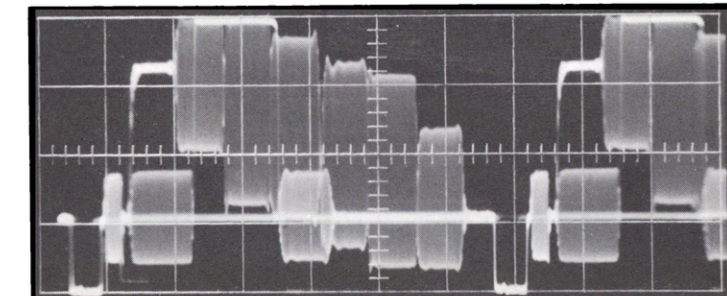
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
17	.5 $\mu$	0.5	3.58 MC	14 pf	75% SAT.	STD. COLOR	
18	.5 $\mu$	0.2	3.58 MC	14 pf	COLOR BARS	STD. COLOR	
19	.5 $\mu$	1.0	3.58 MC	14 pf	COLOR BARS	STD. COLOR	
20	.1 $\mu$	0.5	3.58 MC	14 pf	COLOR BARS	STD. COLOR	
21	.1 $\mu$	2.5	3.58 MC	2.5 pf	COLOR BARS	STD. COLOR	
22	.1 $\mu$	5.0	3.58 MC	2.5 pf	COLOR BARS	STD. COLOR	GROUND
23	.1 $\mu$	1.0	3.58 MC	2.5 pf	COLOR BARS	STD. COLOR	
24	.1 $\mu$	2.0	3.58 MC	2.5 pf	COLOR BARS	STD. COLOR	GROUND
25	.1 $\mu$	2.5	3.58 MC	14 pf	COLOR BARS	STD. COLOR	GROUND
26	.1 $\mu$	1.0	3.58 MC	14 pf	COLOR BARS	STD. COLOR	
27	.1 $\mu$	1.0	3.58 MC	14 pf	COLOR BARS	STD. COLOR	GROUND
28	.1 $\mu$	0.5	HOR.	14 pf	COLOR BARS	STD. COLOR	
29	.5 $\mu$	2.5	HOR.	2.5 pf	COLOR BARS	STD. COLOR	
30	.1 $\mu$	5.0	HOR.	2.5 pf	COLOR BARS	STD. COLOR	
31	.05 $\mu$	1.0	HOR.	14 pf	COLOR BARS	STD. COLOR	
32	.5 $\mu$	0.5	HOR.	14 pf	COLOR BARS	STD. COLOR	



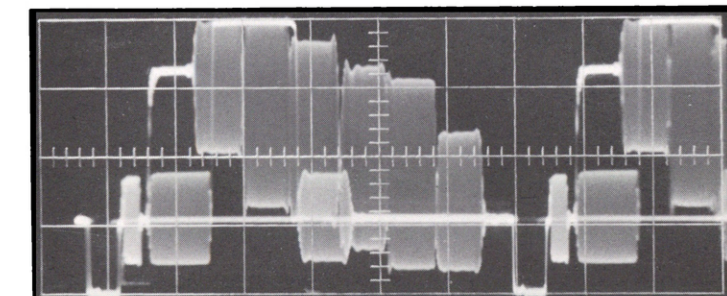
TP 2-12



TP 1-10



TL 1-10



TP005



## Unit

Unit

**Catalog Number** 52650

Issue   D  

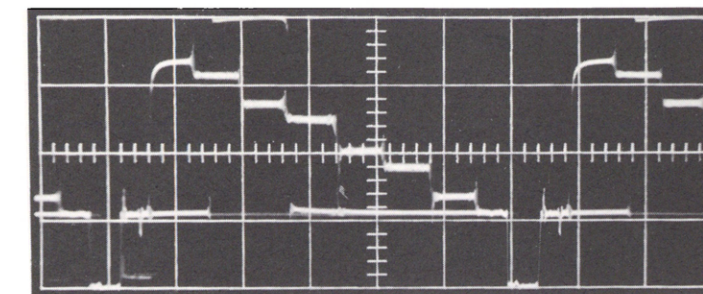
Issue D Reference Series

## PEAK-TO-PEAK VOLTAGES

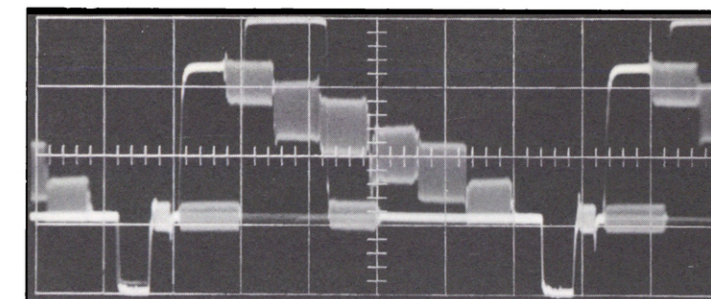
[illegible]

### \* CONDITIONS OF MEASUREMENT

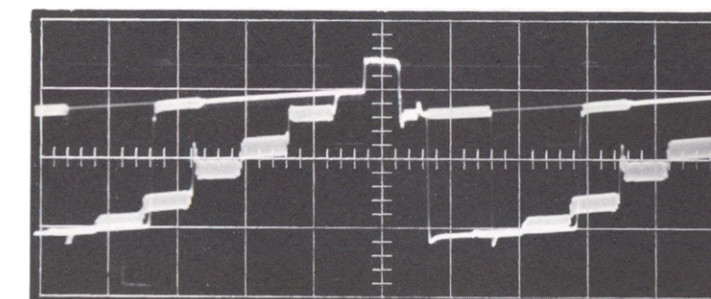
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
33	.1 $\mu$	2.5	HOR.	2.5 pf	75% SAT.	STD.	COLOR GROUND
34	.1 $\mu$	2.5	HOR.	2.5 pf	COLOR BARS	STD.	COLOR
35	.1 $\mu$	1.0	HOR.	14 pf	COLOR BARS	STD.	COLOR GROUND
36	.1 $\mu$	2.0	HOR.	14 pf	COLOR BARS	STD.	COLOR
37	.5 $\mu$	5.0	HOR.	14 pf	COLOR BARS	STD.	COLOR
38	.1 $\mu$	5.0	HOR.	14 pf	COLOR BARS	STD.	COLOR GROUND
39	.1 $\mu$	0.5	HOR.	2.5 pf	COLOR BARS	STD.	COLOR
40	2 $\mu$	1.0	HOR.	14 pf	COLOR BARS	CTL.	OFF
41	10 $\mu$	5.0	HOR.	14 pf	COLOR BARS	CTL.	OFF GROUND
42	.5 $\mu$	5.0	HOR.	14 pf	COLOR BARS	CTL.	OFF
43	1 $\mu$	2.0	HOR.	14 pf	COLOR BARS	CTL.	OFF
44	5 $\mu$	2.0	HOR.	14 pf	COLOR BARS	NON STD.	COLOR
45	2 $\mu$	2.0	HOR.	14 pf	COLOR BARS	CTL.	OFF
46	10 $\mu$	5.0	HOR.	14 pf	COLOR BARS	NON STD.	COLOR
47	.5 $\mu$	5.0	HOR.	14 pf	COLOR BARS	STD.	COLOR
48	.5 $\mu$	0.5	HOR.	2.5 pf	COLOR BARS	STD.	COLOR



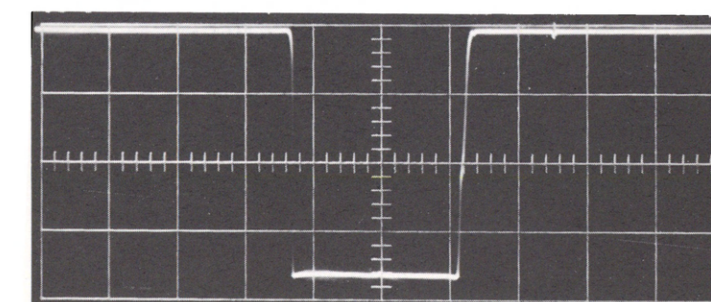
TP005



TL 1-11



TL 2-11



TL 3-11



Unit

**Catalog Number** 52650

**Schematic Number** 54145

Issue D

### Reference Series

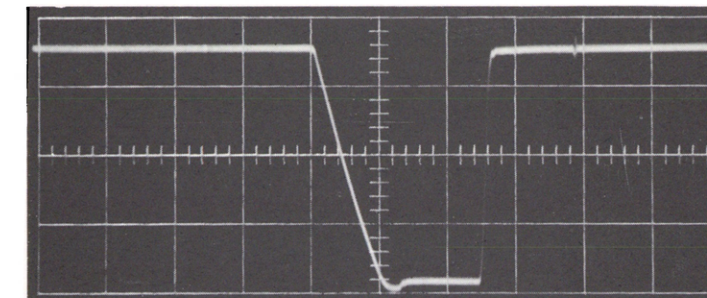
## PEAK-TO-PEAK VOLTAGES

[illegible]

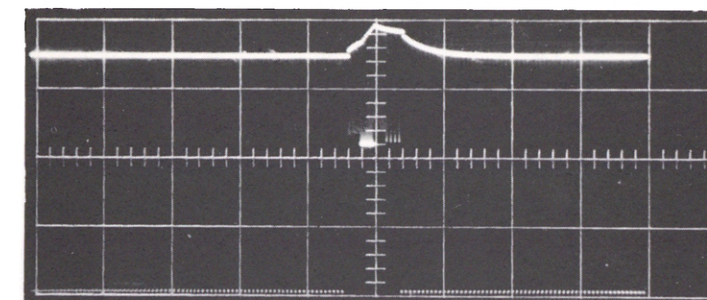
### \* CONDITIONS OF MEASUREMENT

[illegible]

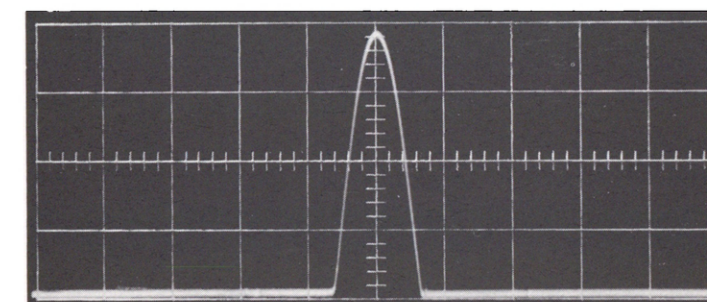
\*\* FREQUENCY OF WAVEFORM AT TL 5-6 TWICE THAT AT TL 3-6



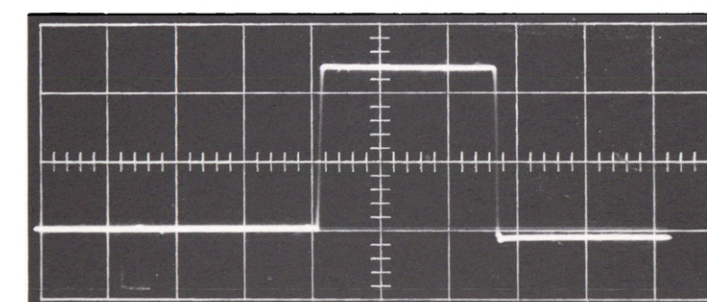
TL 4-11



TL 4-11



TL 5-11



TL 6-11



Unit

**Catalog Number** 52650

**Schematic Number** 54145

Issue D

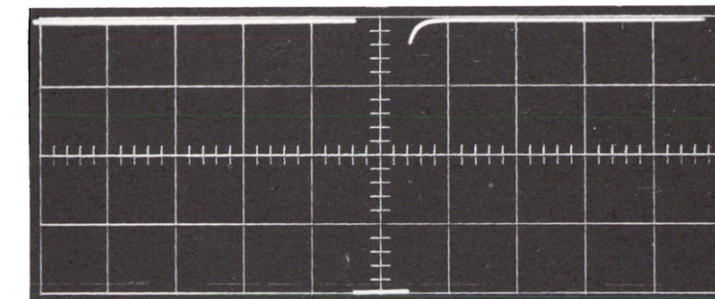
## Reference Series

## PEAK-TO-PEAK VOLTAGES

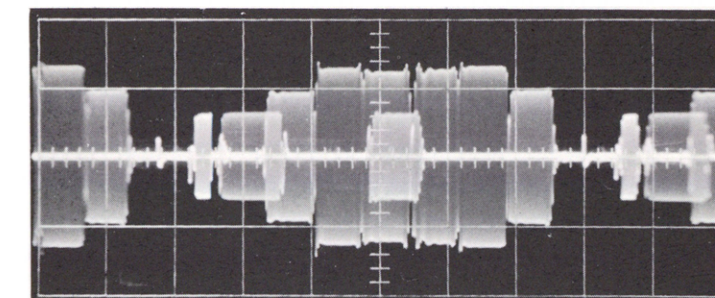
[illegible]

### \* CONDITIONS OF MEASUREMENT

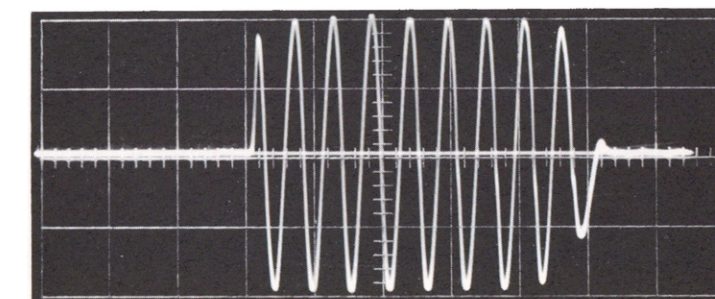
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							



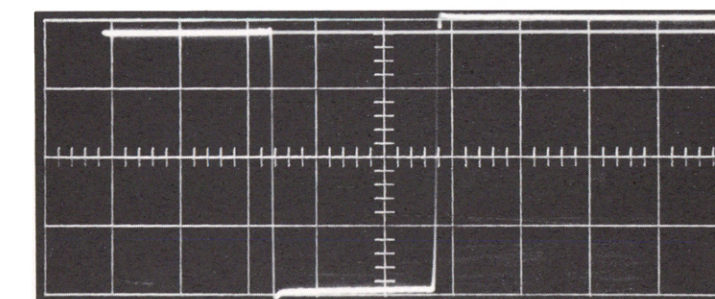
TL 7-11



TL 8-11



TL 9-11



TP 1-11



Unit

**Catalog Number** 52650

**Schematic Number** 54145

Issue D

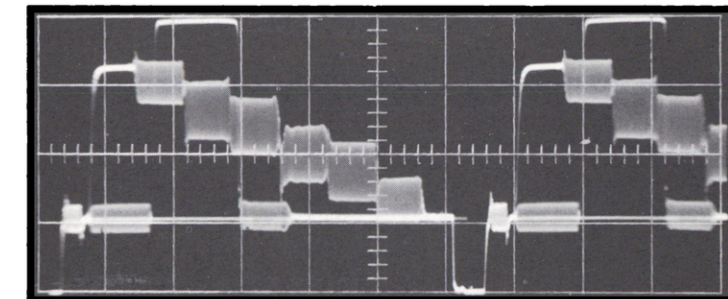
Reference Series \_\_\_\_\_

## PEAK-TO-PEAK VOLTAGES

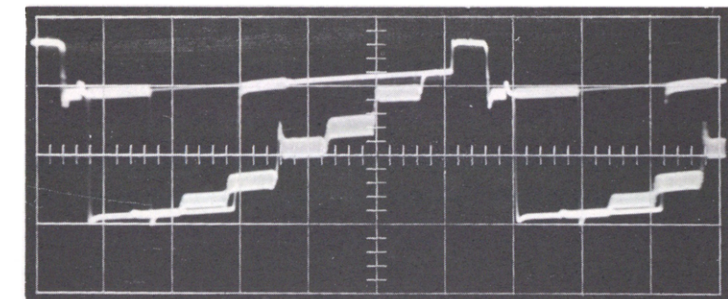
[illegible]

### \* CONDITIONS OF MEASUREMENT

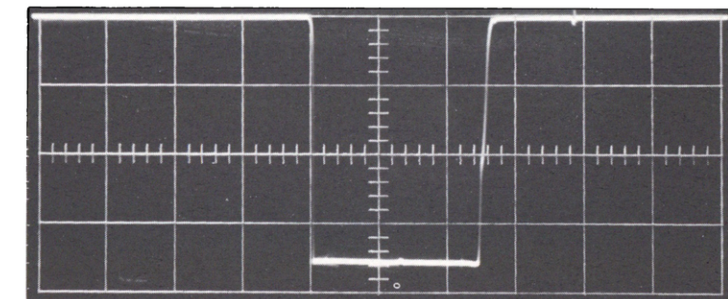
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							



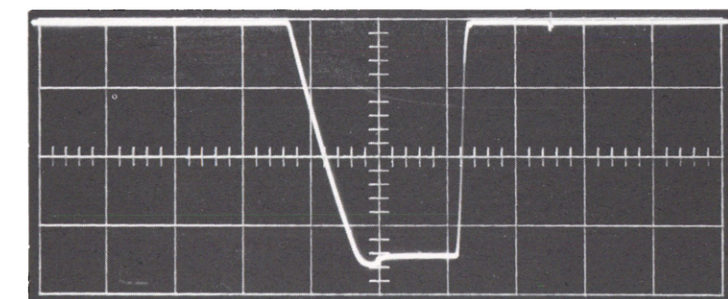
TL 1-5



TL 2-5



TL 3-5



TL 4-5



**COLORTEC**

Unit

**Catalog Number** 52650

**Schematic Number** 54145

Issue D

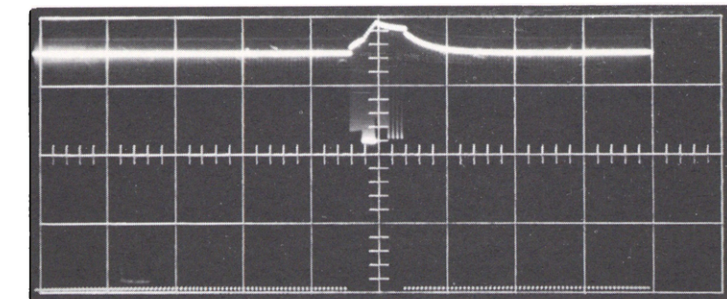
### Reference Series

## PEAK-TO-PEAK VOLTAGES

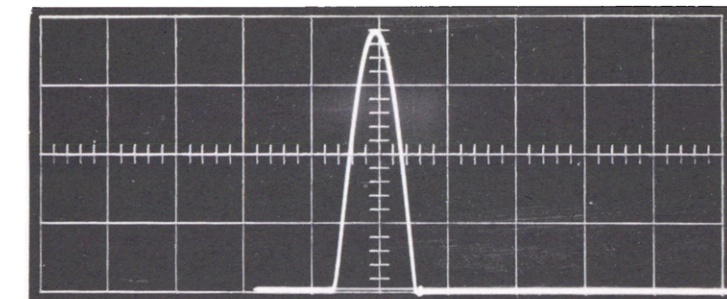
[illegible]

### \* CONDITIONS OF MEASUREMENT

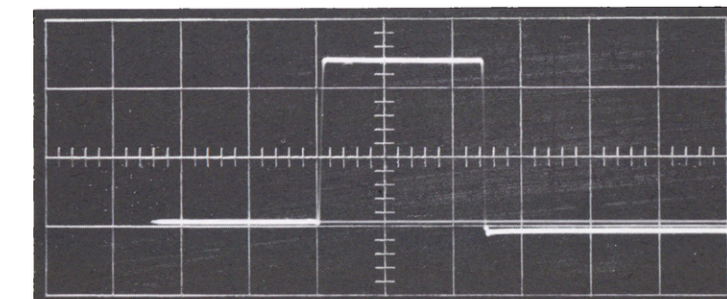
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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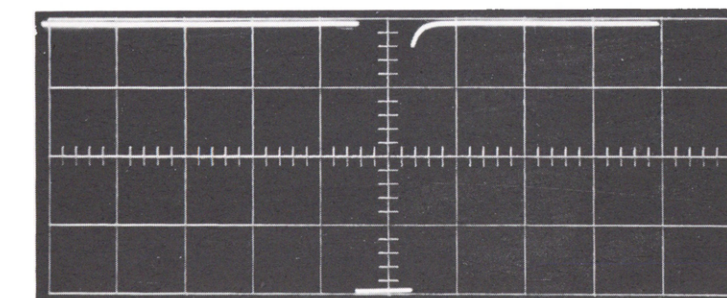
TL 4-5



TL 5-5



TL 6-5



TL 7-5



COLORTEC  
Unit

Unit

**Catalog Number** 52650

**Schematic Number** 54145

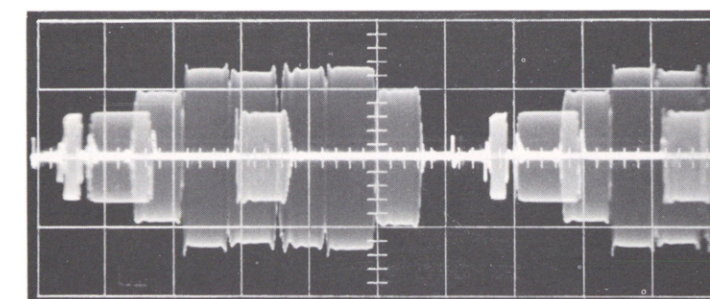
Issue D Reference Series           

## PEAK-TO-PEAK VOLTAGES

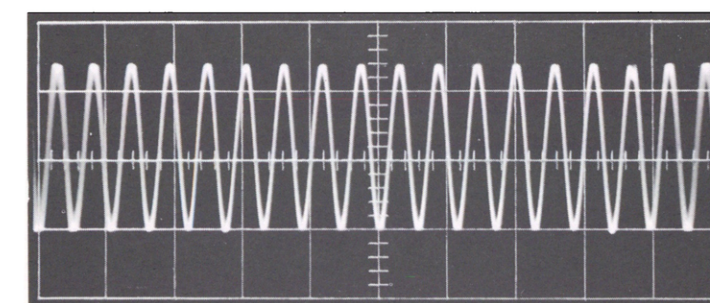
[illegible]

### \* CONDITIONS OF MEASUREMENT

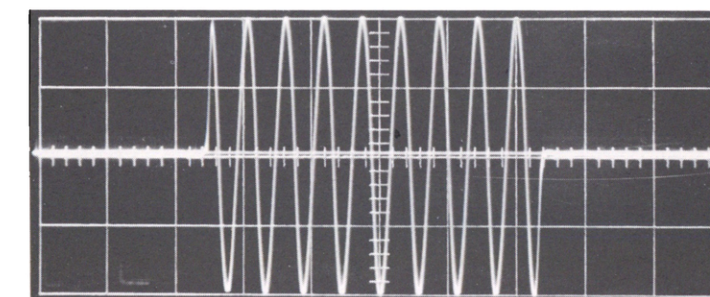
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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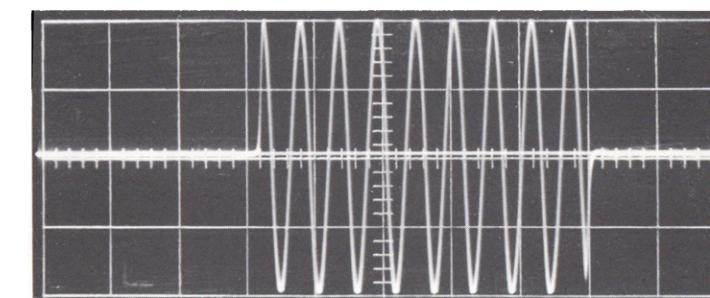
TL 8-5



TL 8-5



TL 9-5



TL 9-5



**COLORTEC**

Unit

**Catalog Number** 52650

**Schematic Number** 54145

Issue D

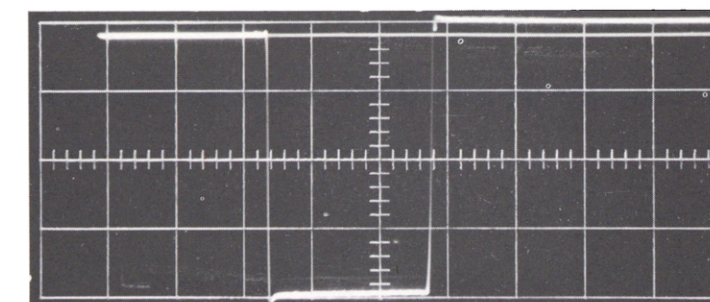
Reference Series \_\_\_\_\_

## PEAK-TO-PEAK VOLTAGES

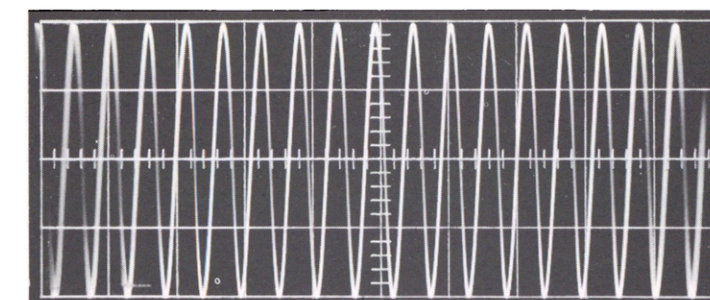
[illegible]

### \* CONDITIONS OF MEASUREMENT

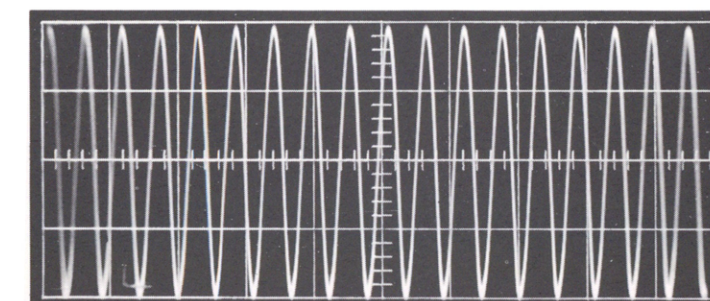
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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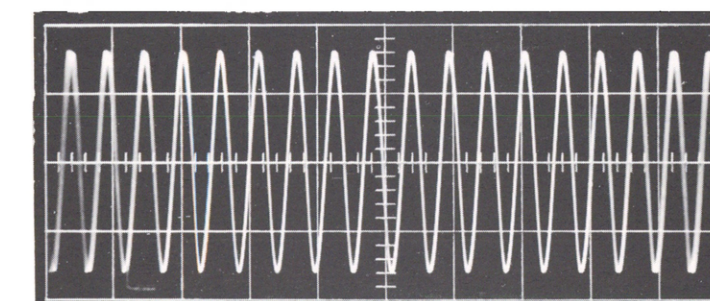
TP 1-5



TP001



TL 1-7



Q 2-7



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Unit

Catalog Number 52650

Issue D Reference Series           

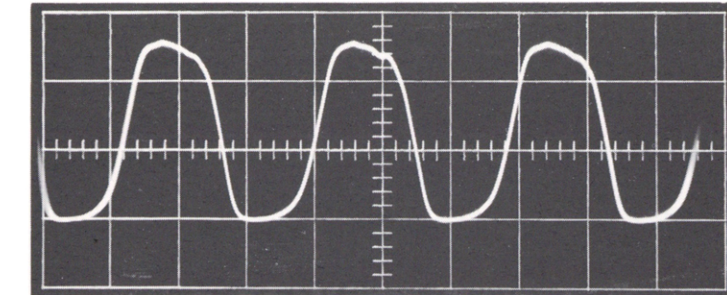
Reference Series \_\_\_\_\_

## PEAK-TO-PEAK VOLTAGES

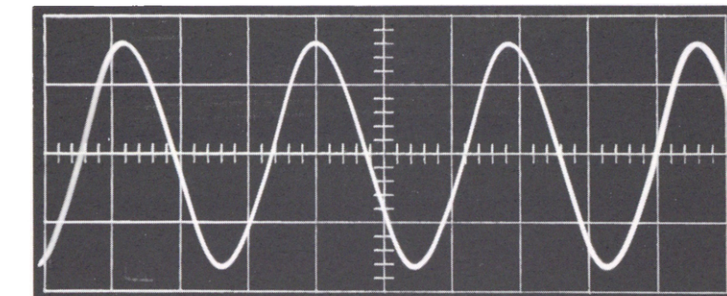
[illegible]

### \* CONDITIONS OF MEASUREMENT

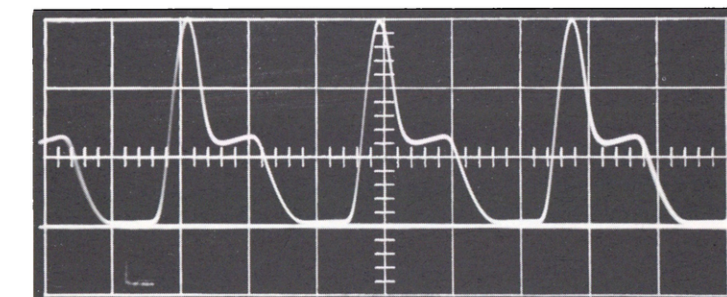
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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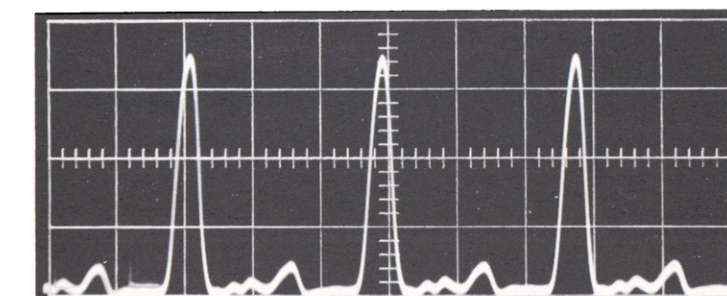
TL 2-7



TL 3-7



TL 4-7



TL 8-7



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**Catalog Number** 52650

**Schematic Number** 54145

Issue D

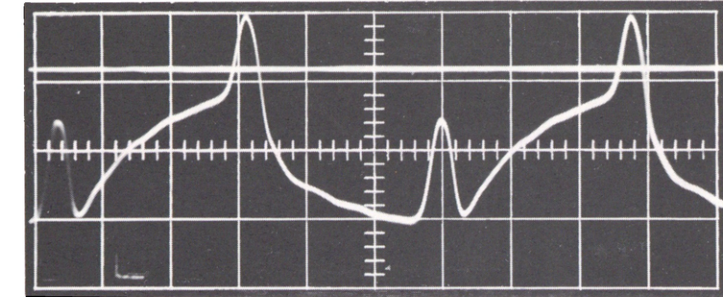
### Reference Series

## PEAK-TO-PEAK VOLTAGES

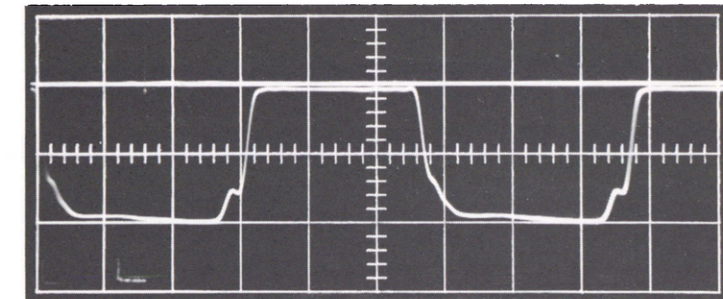
[illegible]

### \* CONDITIONS OF MEASUREMENT

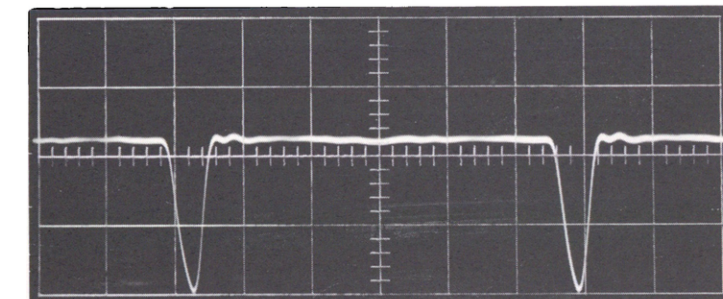
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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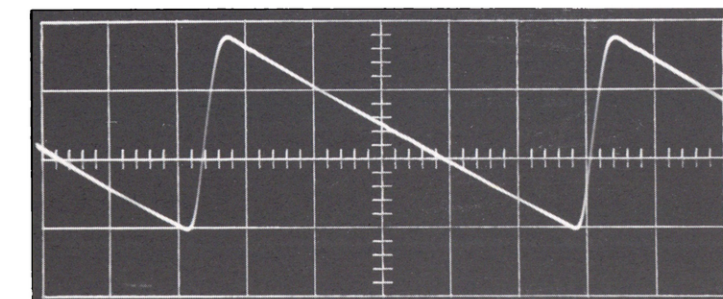
TL 9-7



TL 10-7



TL 5-7



TL 6-7



**COLORTEC**

Unit

**Catalog Number** 52650

**Schematic Number** 54145

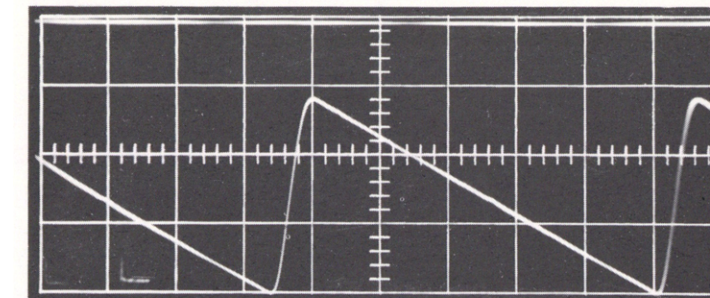
Issue D Reference Series                     

## PEAK-TO-PEAK VOLTAGES

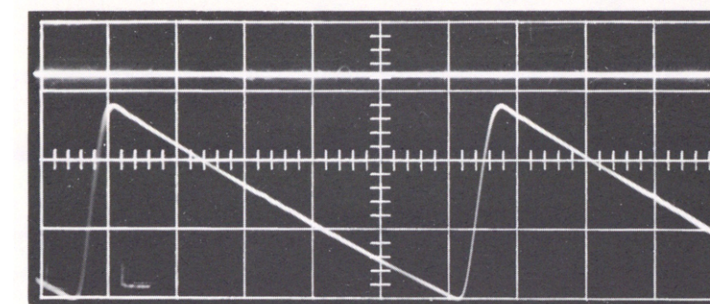
[illegible]

### \* CONDITIONS OF MEASUREMENT

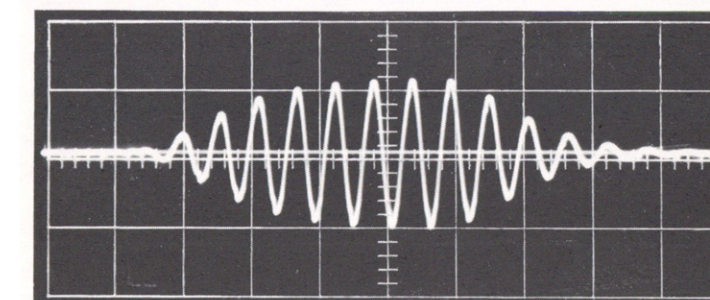
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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TL 7-7



TL 11-7



TL 1-9



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Unit

Catalog Number 52650

**Schematic Number** 54145

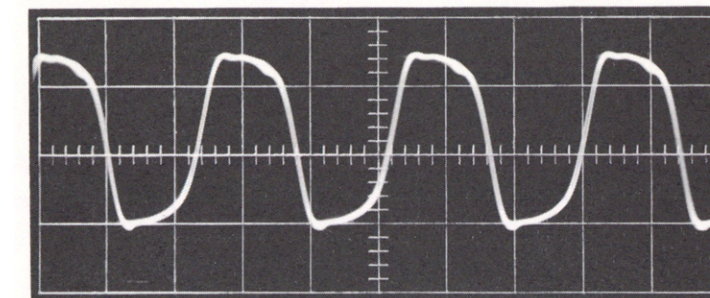
Issue D      Reference Series           

## PEAK-TO-PEAK VOLTAGES

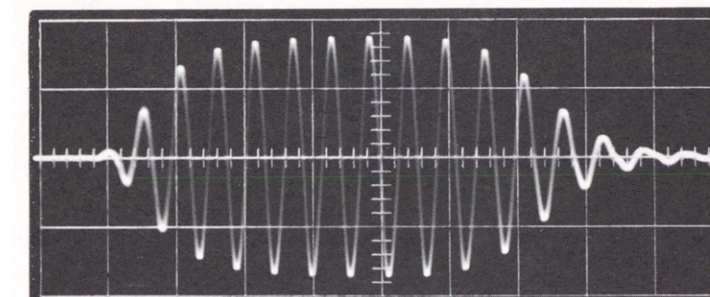
[illegible]

### \* CONDITIONS OF MEASUREMENT

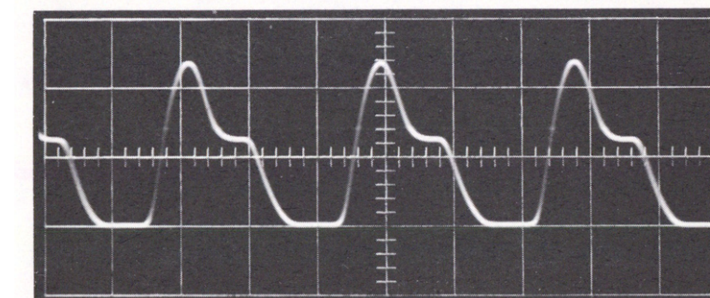
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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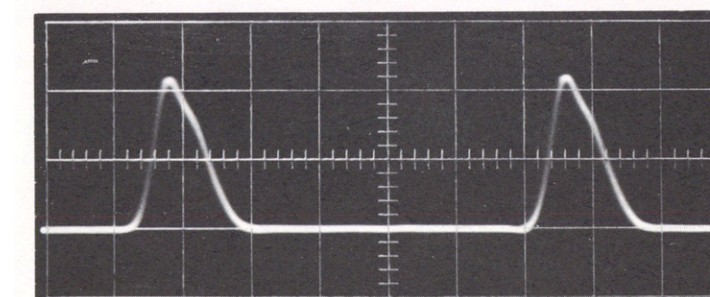
TL 2-9



TL 3-9



TL 9-9



TL 5-9



Unit

**Catalog Number** 52650

**Schematic Number** 54145

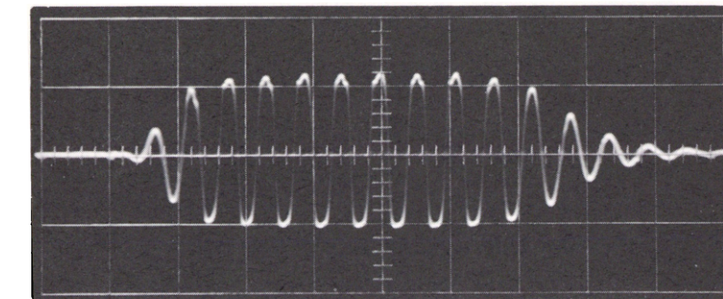
Issue D      Reference Series           

## PEAK-TO-PEAK VOLTAGES

[illegible]

### \* CONDITIONS OF MEASUREMENT

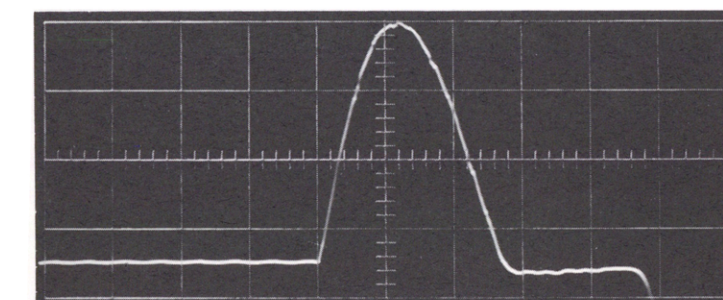
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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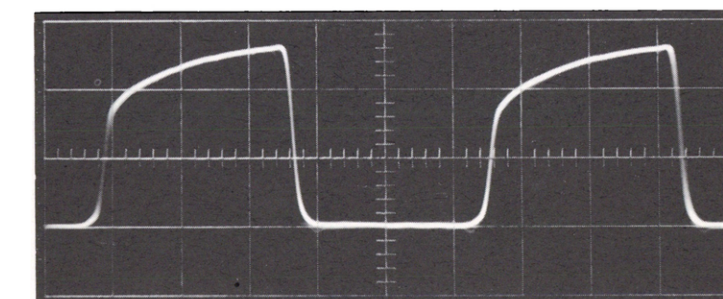
TL 7-9

SAME AS TP 1-11

TL 8-9



TL 6-9



TL 1-8

Unit

**Catalog Number** 52650

Schematic Number 54145

Issue     D    

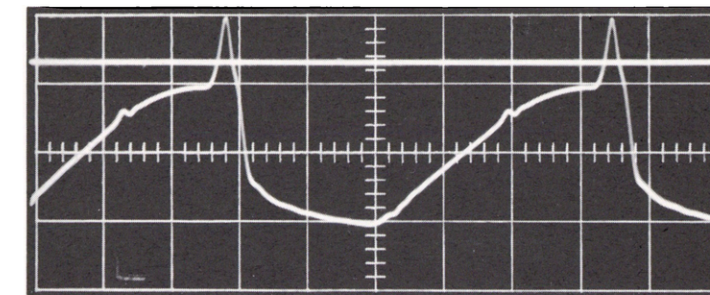
Reference Series \_\_\_\_\_

## PEAK-TO-PEAK VOLTAGES

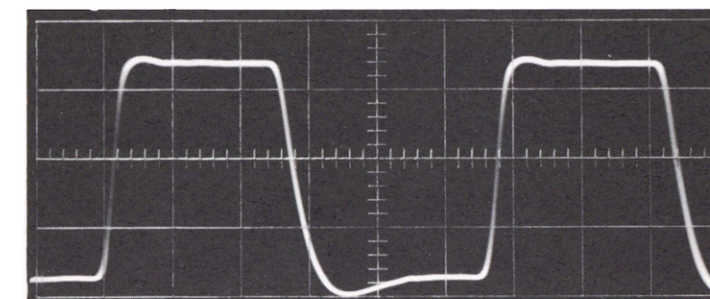
[illegible]

### \* CONDITIONS OF MEASUREMENT

Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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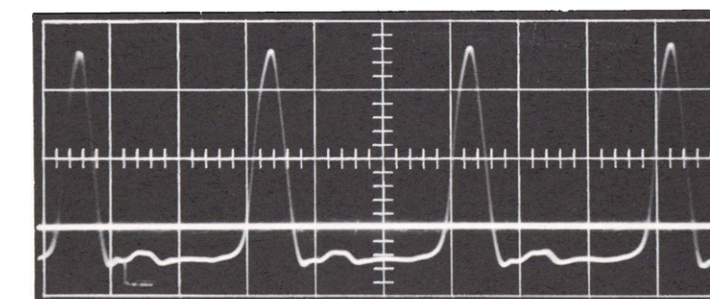
TL 11-8



TL 2-8

SAME AS TL 4-9

TL 8-8



TL 9-8



Unit

**Catalog Number** 52650

**Schematic Number** 54145

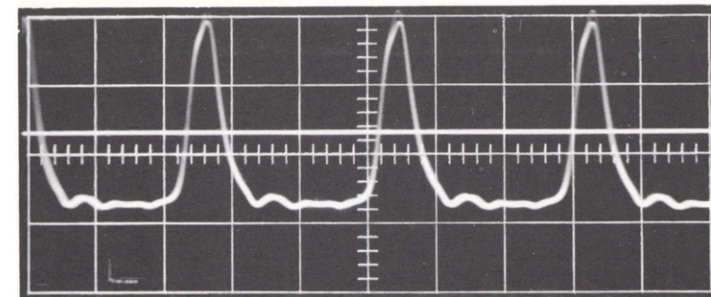
Issue D      Reference Series                     

## PEAK-TO-PEAK VOLTAGES

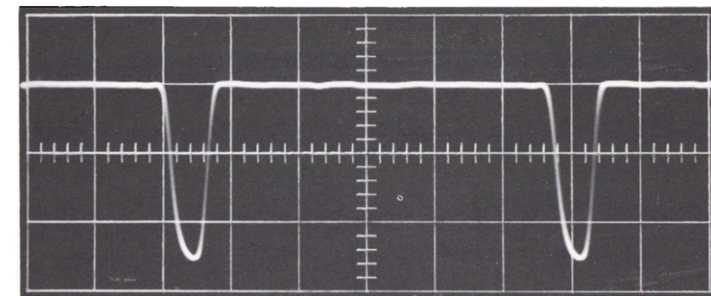
[illegible]

### \* CONDITIONS OF MEASUREMENT

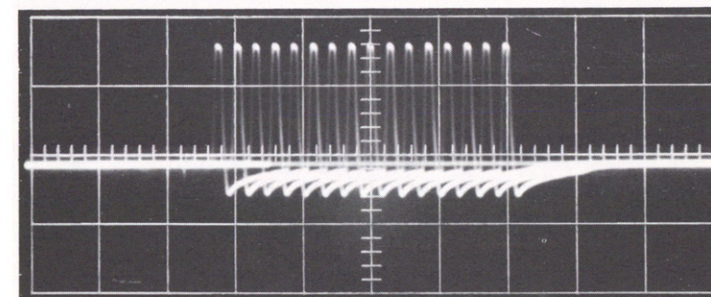
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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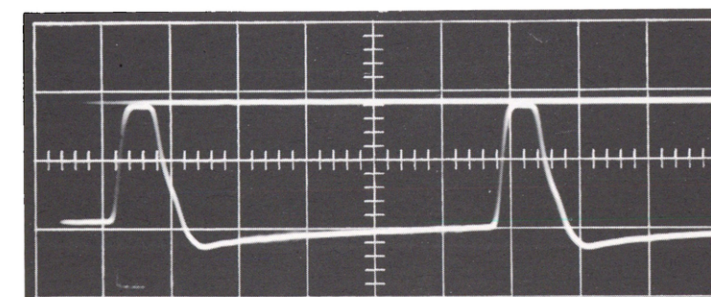
TL 10-8



TL 3-8



TL 4-8



TL 4-8



COLORTEC

Unit

**Catalog Number** 52650

Schematic Number 54145

Issue     D    

Reference Series \_\_\_\_\_

## PEAK-TO-PEAK VOLTAGES

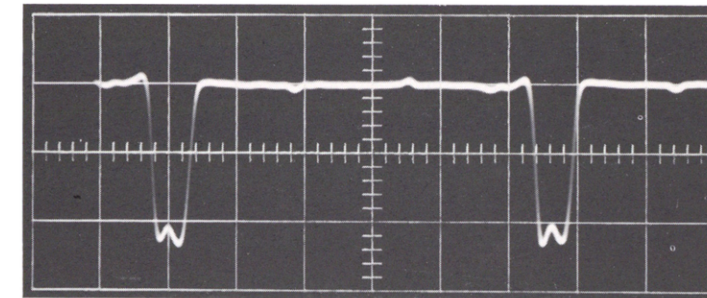
[illegible]

### \* CONDITIONS OF MEASUREMENT

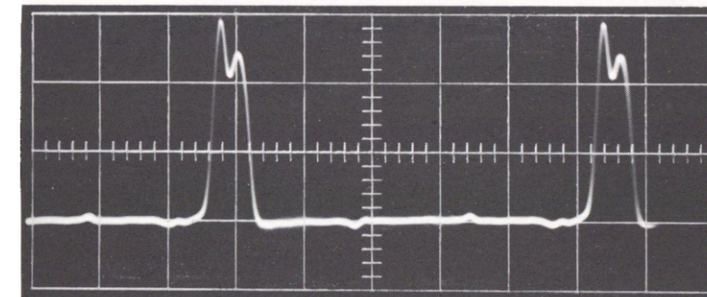
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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SAME AS TL 11-7

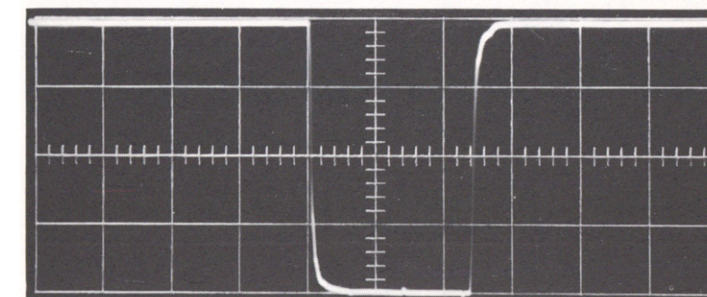
TL 5-8



TL 6-8



TL 7-8



TL 1-3



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**Unit**

Catalog Number 52650

**Schematic Number** 54145

Issue D

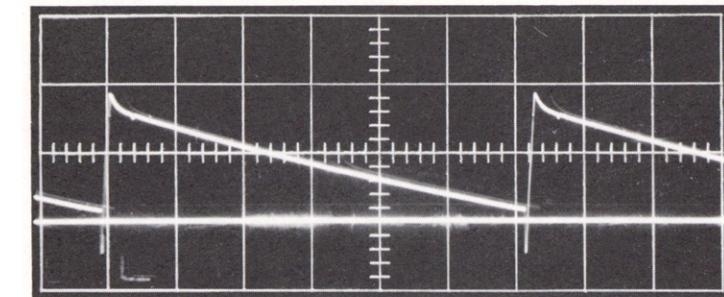
### Reference Series.

## PEAK-TO-PEAK VOLTAGES

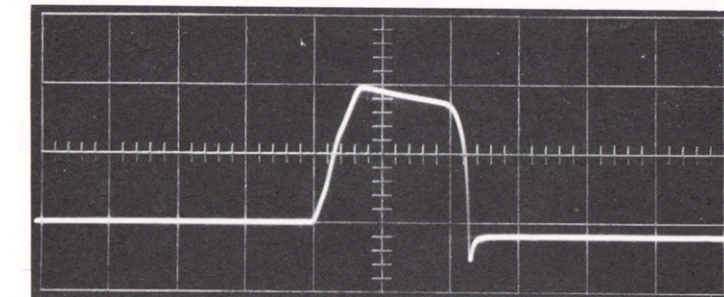
[illegible]

### \* CONDITIONS OF MEASUREMENT

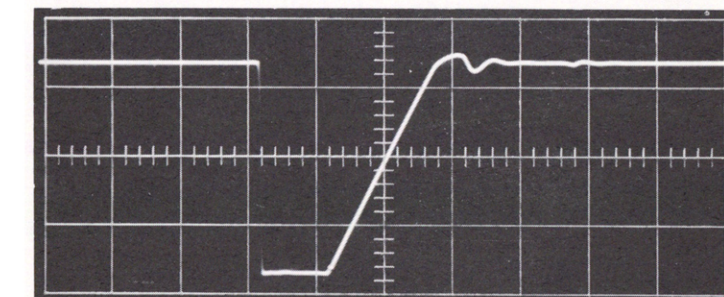
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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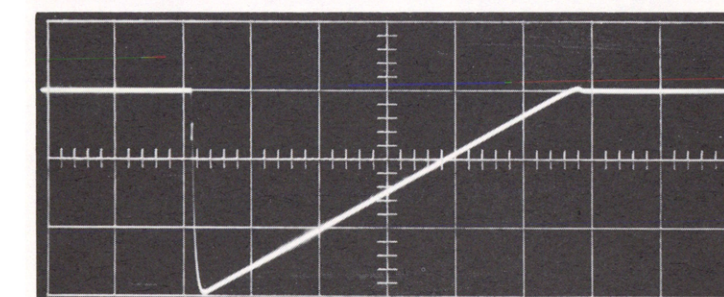
TL 2-3



TL 3-3



TL 4-3



TL 4-3



Unit

**Catalog Number** 52650

**Schematic Number** 54145

Issue D

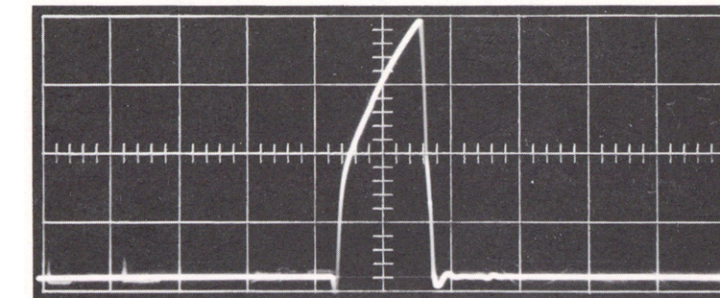
### Reference Series.

## PEAK-TO-PEAK VOLTAGES

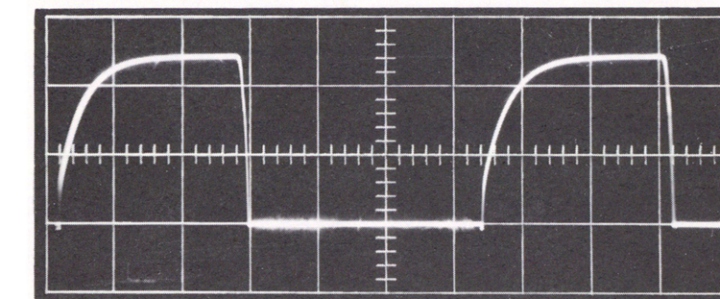
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### \* CONDITIONS OF MEASUREMENT

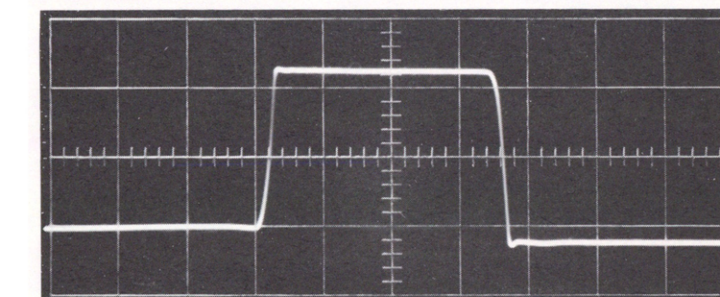
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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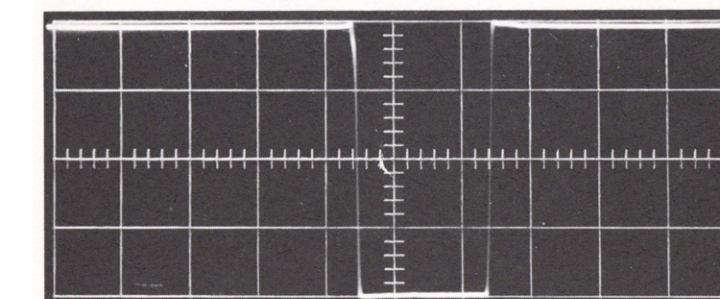
TL 5-3



TL 5-3



TL 6-3



TP 1-3

COLORTEC  
Unit

**Catalog Number** 52650

**Schematic Number** 54145

Issue D

Reference Series \_\_\_\_\_

## PEAK-TO-PEAK VOLTAGES

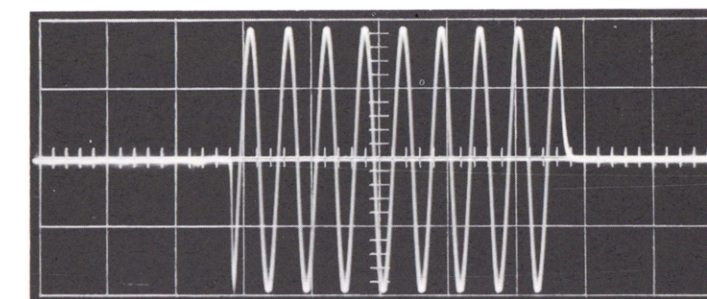
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### \* CONDITIONS OF MEASUREMENT

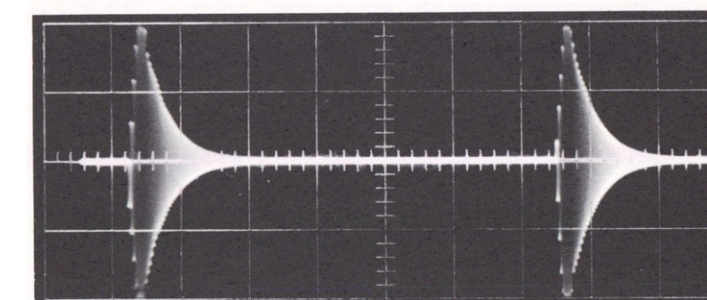
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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SAME AS TL 9-11

TP 4-10



TL 2-10



TL 3-10

SAME AS TP 1101

TP 1-6



COLORTEC

Unit

**Catalog Number** 52650

**Schematic Number** 54145

Issue D

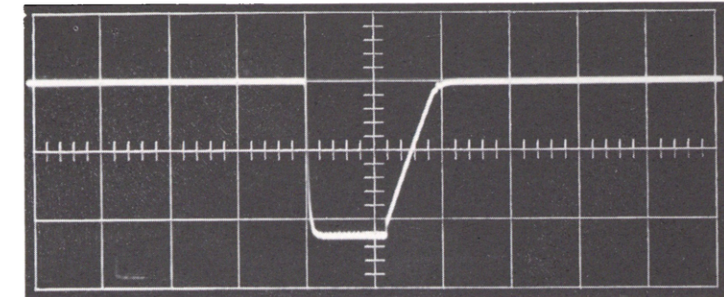
Reference Series \_\_\_\_\_

## PEAK-TO-PEAK VOLTAGES

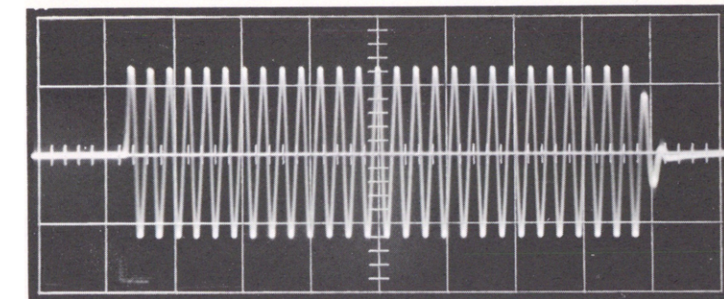
[illegible]

### \* CONDITIONS OF MEASUREMENT

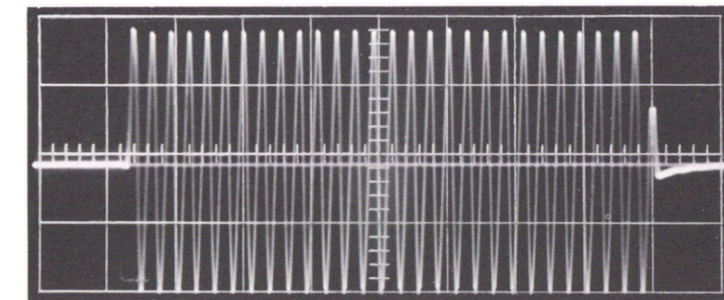
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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TL 1-6



TL 2-6



TL 3-6

SAME AS TL 7-9

TP 2-6

COLORTEC

Unit

**Catalog Number** 52650

**Schematic Number** 54145

Issue D

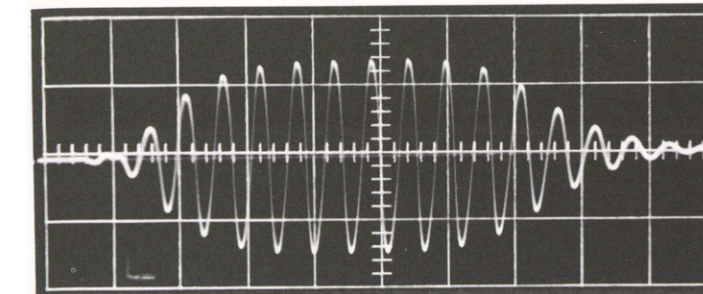
Reference Series \_\_\_\_\_

## PEAK-TO-PEAK VOLTAGES

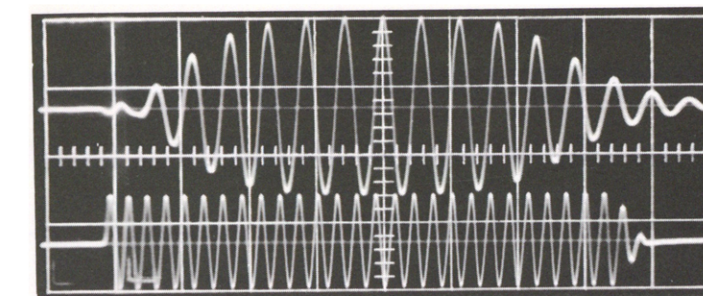
[illegible]

### \* CONDITIONS OF MEASUREMENT

Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
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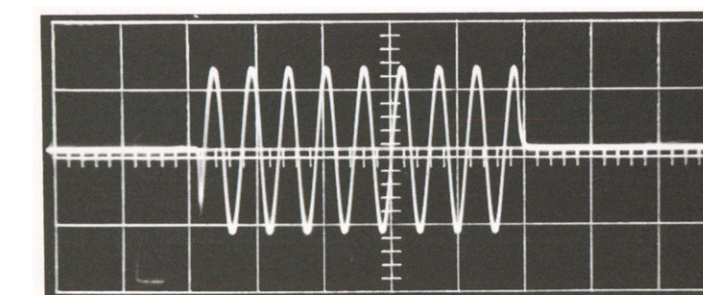
TL 5-6



TL 5-6 AND TL 3-6

SAME AS TL 9-5

TP 1-4



TL 1-4



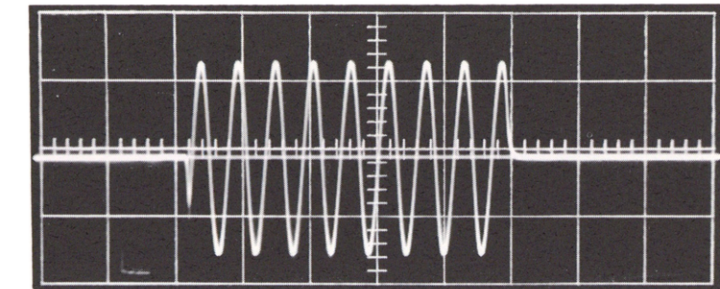
COLORTEC  
Unit

**Catalog Number** 52650

**Schematic Number** 54145

Issue D Reference Series           

## PEAK-TO-PEAK VOLTAGES

[illegible]

TL 2-4

SAME AS TL 2-4

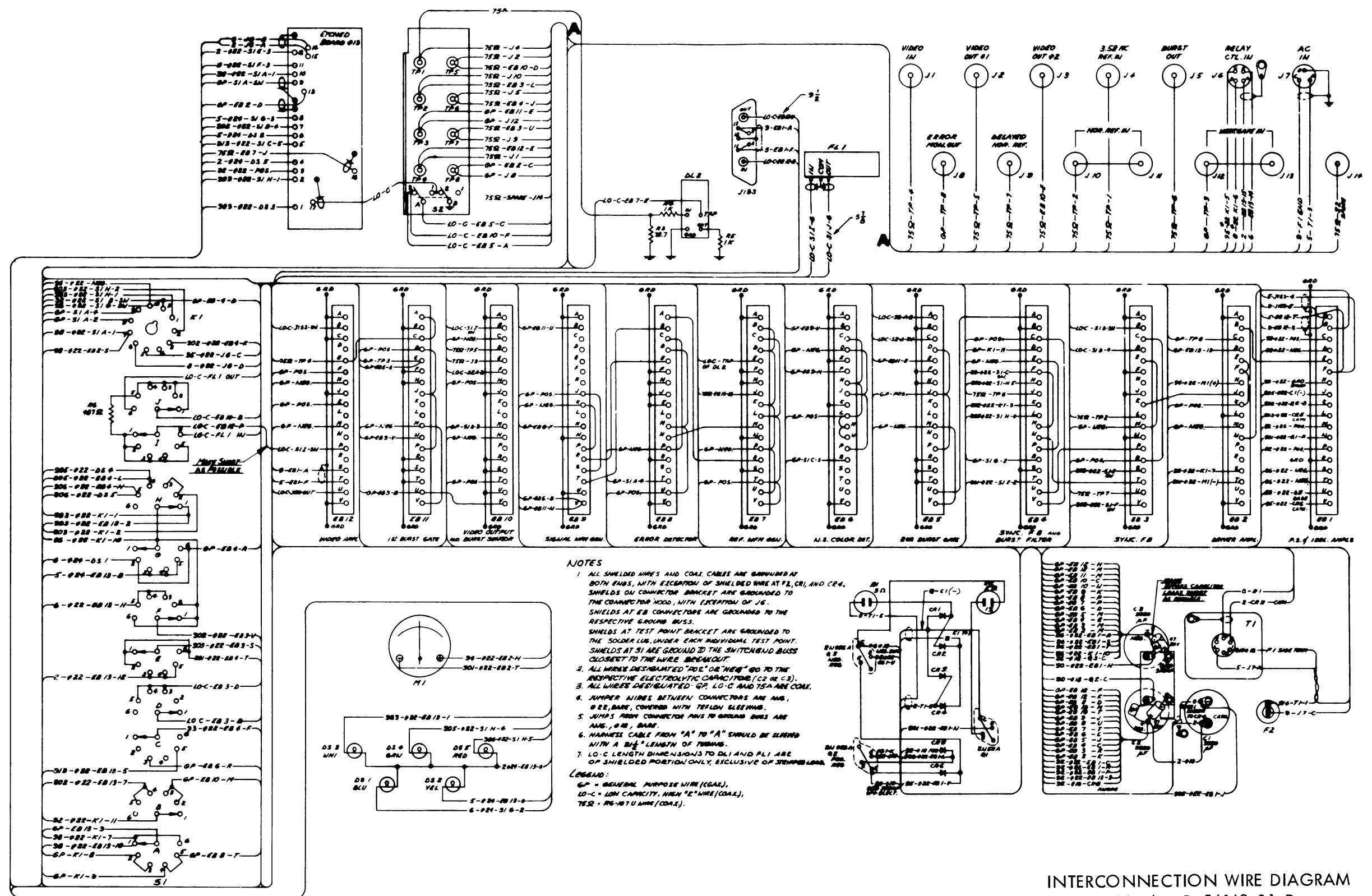
TP006

### \* CONDITIONS OF MEASUREMENT

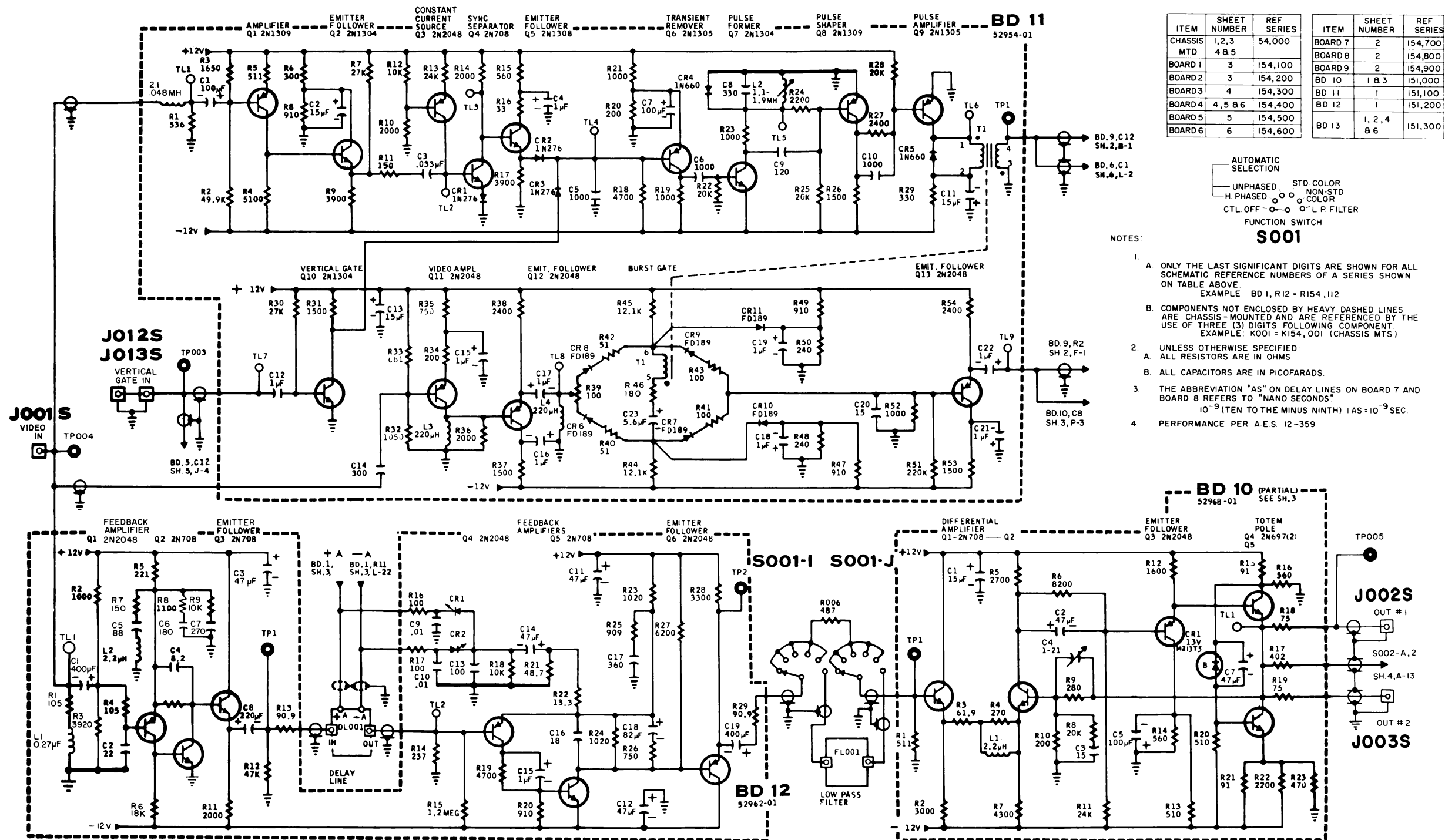
Condition Number	OSCILLOSCOPE SETTING			Probe Used	Signal Present	Operating Mode	Other
	Time/cm	Volts/cm	Synchronized to				
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

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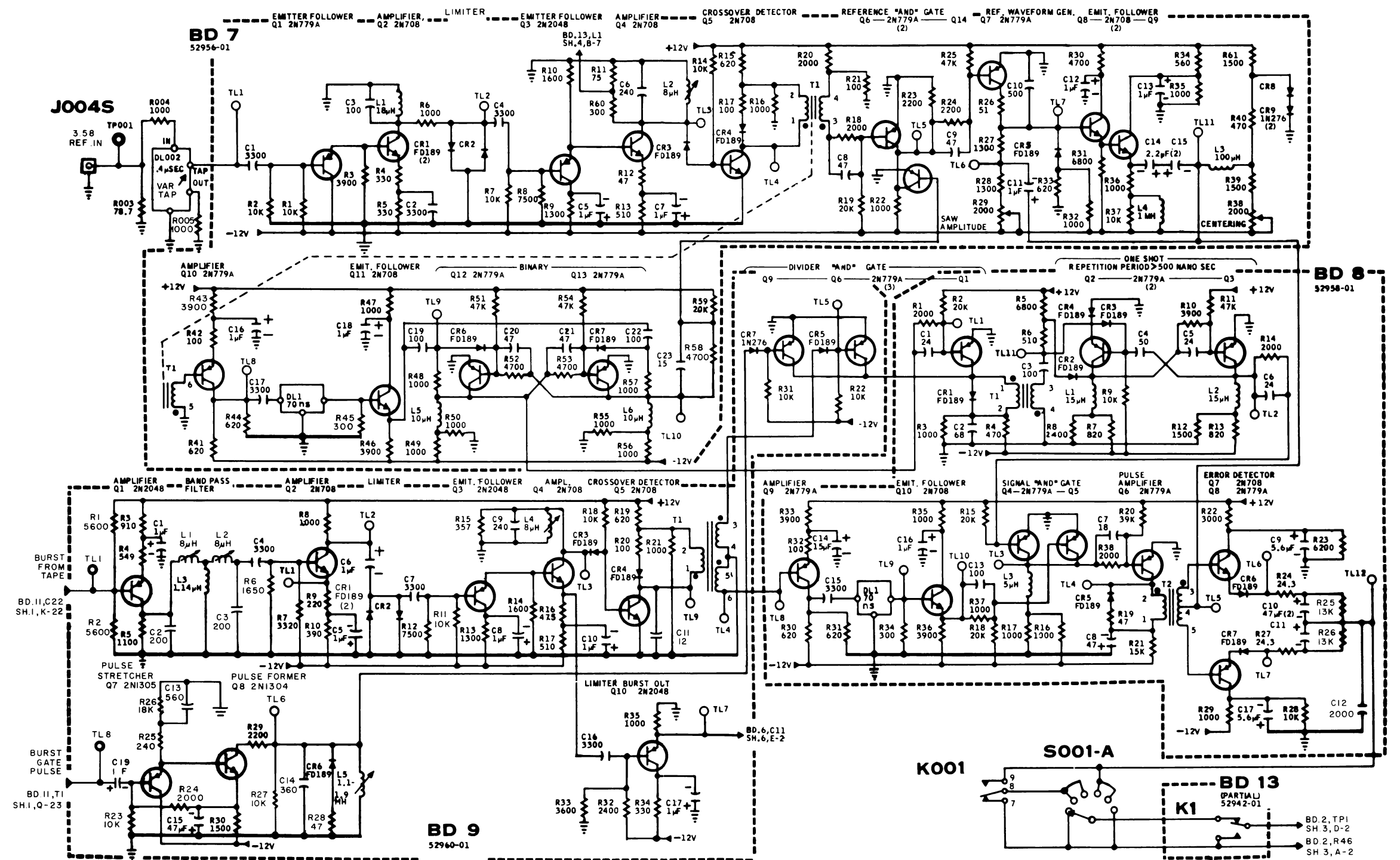
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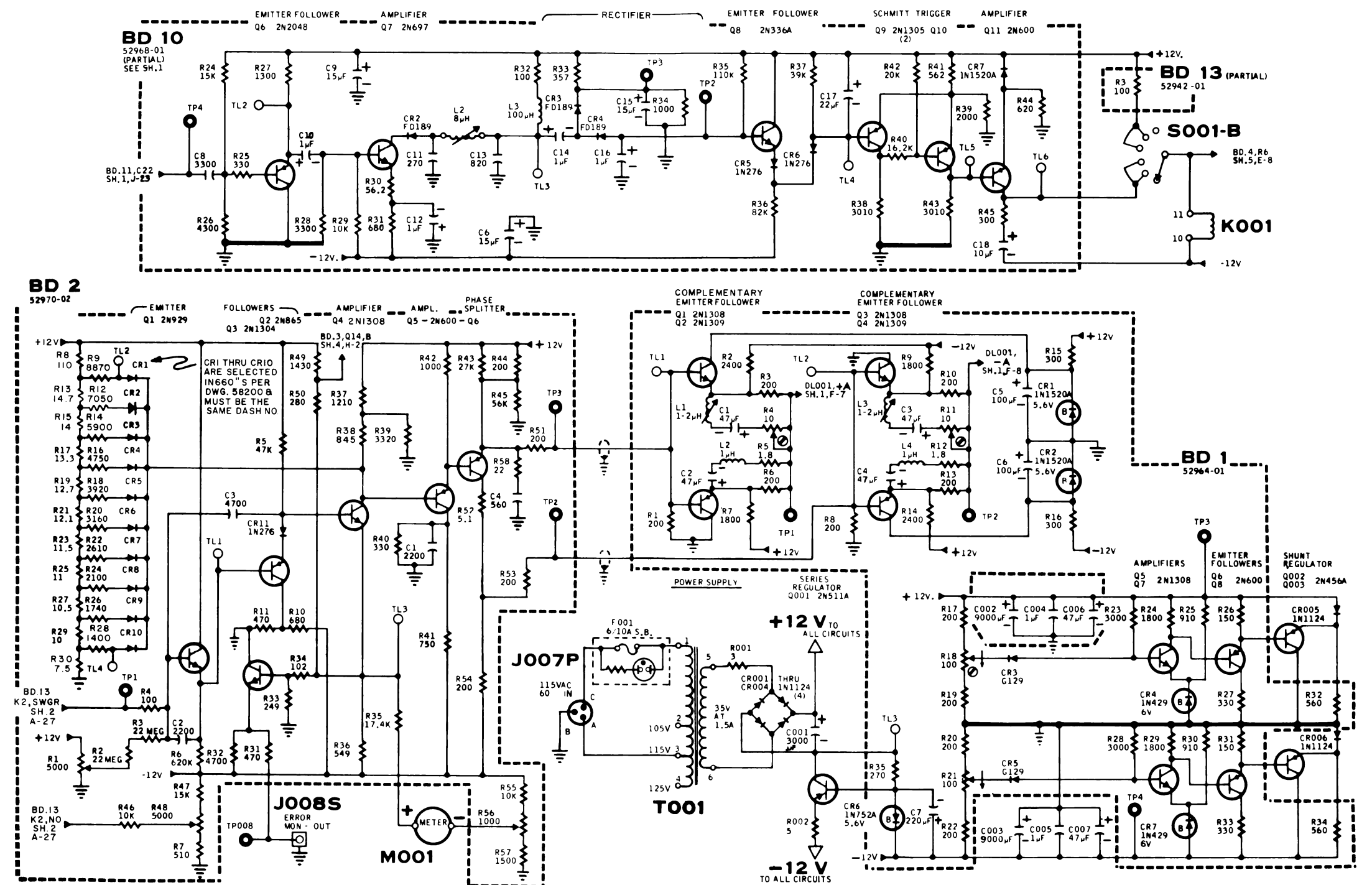


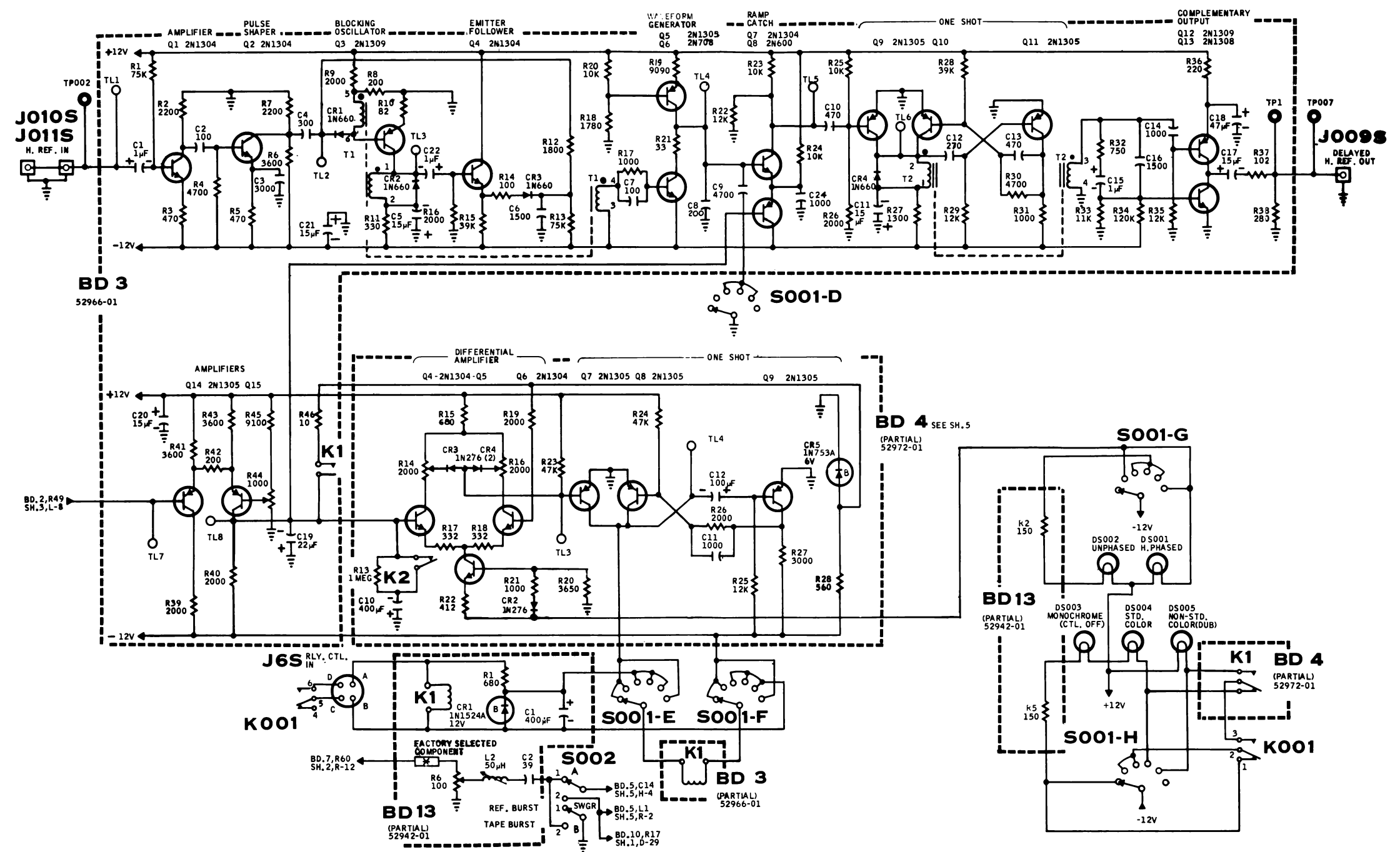
INTERCONNECTION WIRE DIAGRAM  
Drawing Number D-54163-01-D

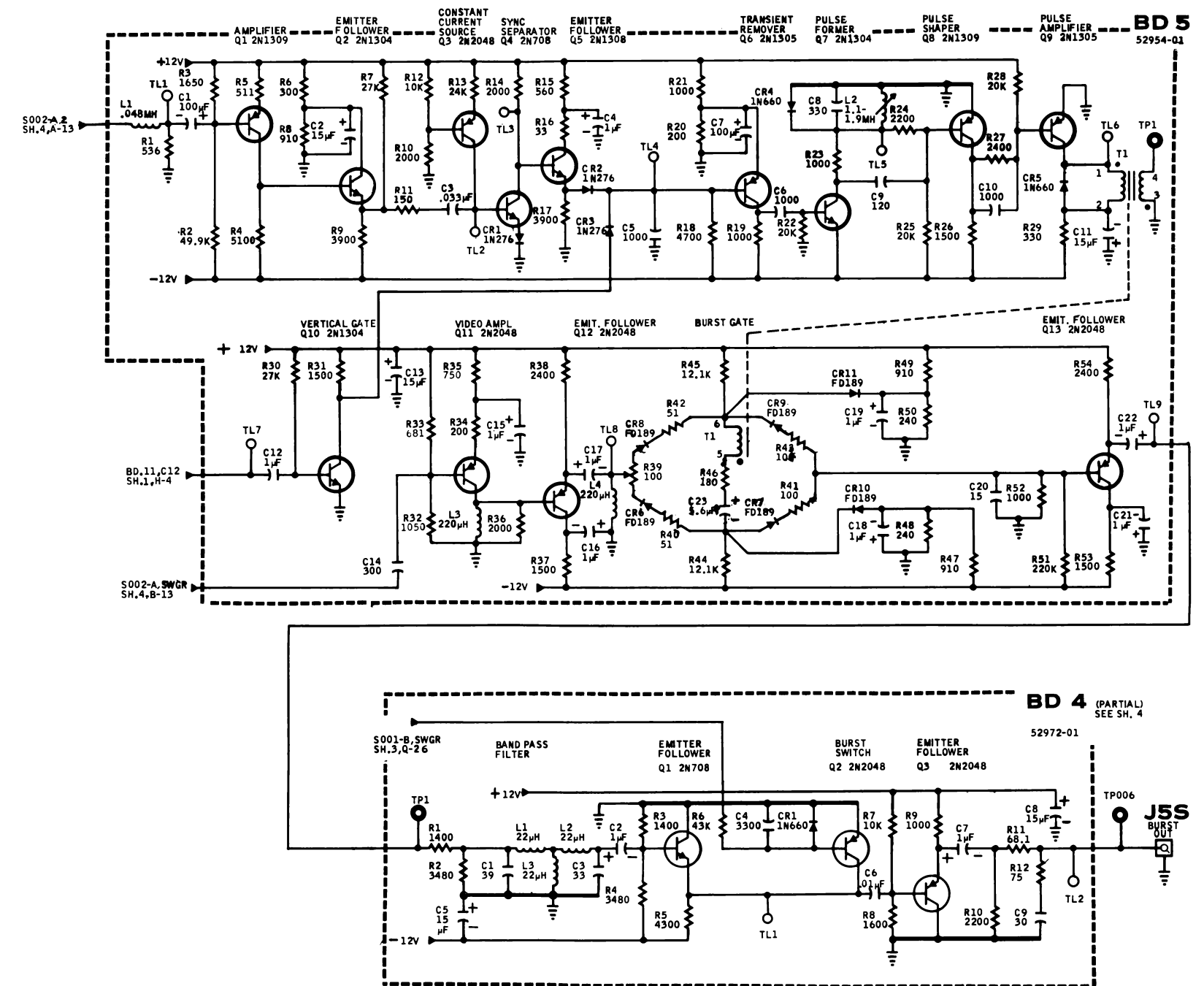


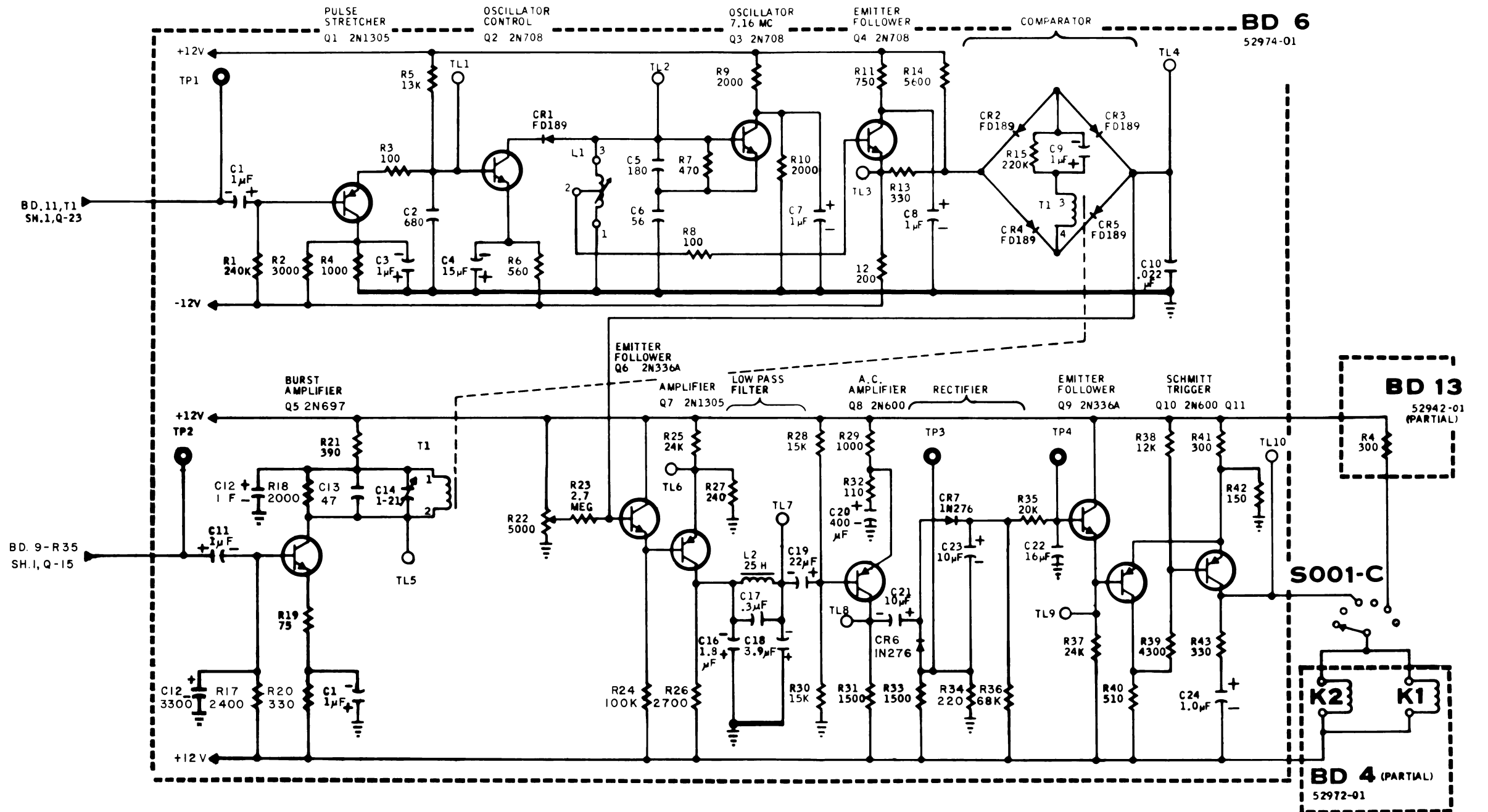














<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
	Connector, Mounting Bracket	C-52992-01
	Connector, Mounting Bracket	C-52992-02
	Test Point Mounting Bracket	C-52998-01
S001	Switch, 10 P, 6 Position	C-58406-01
	Etched Board #13 Assembly	C-52942-01
C004, 005	Capacitor, Ceramic, 1 mfd, 25v, 20%	030-094
C006, 007	Capacitor, Tant, 47 mfd, 20v, 20%, Pol	037-999
	Grommet, 1 3/4 O.D.	260-053
R004, 005	Resistor, Fixed, Comp, 1k, 1/2w, 5%	041-245
R003	Resistor, Fixed, DF, 78.7 ohms, 1/2w, 1%	042-463
R006	Resistor, Fixed, DF, 487 ohms, 1/2w, 1%	042-462
S002	Switch, Toggle	120-116
J007	Connector, Receptacle, Male, 3 Pin	143-997
J006	Connector, Male, 4 Pin	147-146
J001, 002, 003, 004, 005, 008, 009, 010, 011, 012, 013, 014	Connector, Receptacle, Female, 1 Pin	146-067
J015	Connector, Receptacle, Female, 7 Contacts	146-985
	Connector, Receptacle, Female, 18 Pins	146-986
TP001, 002, 003, 004, 005, 006, 007, 008	Test Point	148-012
Ref. K001	Relay Socket	150-994
	Connector, Misc., Hood (For 146-067)	169-010
	Connector, Misc., Hood (For 143-997)	169-013
	Connector, Misc., Hood (For 146-985)	169-982
	Solderless Connector	171-016
	Solder Lug, #6, Int. Teeth	172-003
	Solder Lug, #4, Int. Teeth	172-004
	Solder Lug, #10, Int. Teeth	172-005
	Solder Lug, #5	172-008
	Solder Lug	172-032
	Tie Strip	180-025
	#12 Bus Bar	186-001
	Lacing Cord, Black	296-002
	Fastener, Connector	310-106
	Screw, Sem, Pan Hd, Ph. Dr, #6-32 x 1/4, Int. T.	475-051
	Screw, Sem, Pan Hd, Ph. Dr, 4-40 x 5/16, Int. T.	475-055
	Screw, Self Tapping, 4-40 x 5/16 Lg.	476-057
	Nut, Hex, 4-40	492-008
	Tubing, Black	600-007
	Tubing, Non-Metallic, Clear, #8	600-013
	Tubing, Non-Metallic, Clear, #14	600-021
	Tubing, Teflon, #20	600-036
	Tubing, Black 1/2" ID	600-071
	Wire, Strd, Ins, Dbl Tinned 22 Ga, Wht, Gry, Orn	611-131
	Wire, Strd, Ins, Dbl Tinned, 24 Ga, Red	611-268
	Wire, Strd, Ins, Dbl Tinned, 24 Ga, Grn	611-317
	Wire, Strd, Ins, Dbl Tinned, 24 Ga, Blu	611-318
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Gry	611-519
	Wire, Strd, Ins, Dbl Tinned, 18 Ga, Wht, Red	611-539
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Yel	611-542
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Blk	611-545
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Orn	611-546
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Grn	611-547
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Gry	611-548
	Wire, Strd, Ins, Dbl Tinned, 18 Ga, Wht, Blk	611-554

## HARNESS — COLORTEC

Schematic No. 54145

<i>Schematic Reference</i>	<i>Description</i>	<i>Ampex Part Number</i>
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Blu	611-557
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Blk, Brn	611-573
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Blk, Red	611-574
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Blk, Orn	611-575
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Blk, Grn	611-577
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Brn, Orn	611-578
	Wire, Strd, Ins, Dbl Tinned, 18 Ga, Wht, Blu	611-584
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Blk, Blu	611-591
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Wht, Red	611-673
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Blu	611-679
	Wire, Strd, Ins, Dbl Tinned, 22 Ga, Red	611-682
	Wire, Strd, Ins, Dbl Tinned, 18 Ga, Wht, Brn, Yel	611-592
	Wire, Shielded, Low Capacity	616-047
	Wire, Shielded, Gen. Purpose (White)	613-021
	Coax, 75 ohm, RG187U	613-989
	Wire, Bare, #22	615-002
	Wire, Bare, #18	615-020
	Cable, Shielded, 2 Cond, Red/Blue	616-001
	Cable, Shielded, 2 Cond, White/Green	616-024
	Cable, Shielded, 2 Cond, Red/Black	616-972

## BORG 3000 SERIES MICRODIAL® MOUNTING INSTRUCTIONS

Following are instructions for the mounting of the Borg 3000 Series MICRODIAL to a Borg MICROPOT® potentiometer, or other rotary device of ten turns or less requiring accurate turns counting and positioning. The MICRODIAL has been assembled, tested and phased.

**NOTE:** The MICRODIAL is locked in this phased position by a 4/40 holding screw which should not be removed until after installation is completed. It should then be removed and replaced with the 4/40 Allen set screw enclosed.

The MICRODIAL is composed of two major parts: (1) the mounting plate, (mounting plate and brake knob assembly when MICRODIAL is supplied with brake), and (2) the turns-counting mechanism which is housed and retained in the aluminum control knob. These two major parts snap together and are located in correct relationship by means of two keys located in the aluminum knob section and corresponding keyways in the mounting plate. Knob and mounting plate assemblies can be separated for mounting by pulling apart.

1. Drill panel in accordance with outline corresponding to MICROPOT application.
2. Secure mounting plate to MICROPOT shaft and panel. Use adapter ring or spacer as determined from cross-section views which apply.
3. Turn MICROPOT shaft *counter-clockwise* to stop or zero-setting.
4. Slide MICROPOT onto MICROPOT shaft until it rests lightly upon the mounting plate face. Apply *light* fingertip pressure and rotate knob *counter-clockwise* to index keys and their ways. **DO NOT ROTATE CLOCKWISE.**
5. Press knob section into mounting plate to seat the assembly. A slight snap will indicate proper operating position.
6. Tighten Allen set screw locking MICROPOT to shaft.
7. Remove 4/40 holding screw and replace with 4/40 Allen set screw.
8. Check MICROPOT for zero-setting to correspond with stop on MICROPOT.
9. Apply set-screw hole seals. **CAUTION:** Surface must be clean to assure best adhesion of seals to knob. If surface must be cleaned, use *only* mild soap and water.
10. Should it be necessary to remove the MICROPOT, rotate to zero-point. Remove one of the 4/40 Allen set screws and replace it with the holding screw. Loosen the other set screw and pull MICROPOT knob outward to disengage snap-on assembly.

